LESSONS LEARNED FROM A RETROSPECTIVE ANALYSIS OF AGRICULTURAL AND NATURAL RESOURCE MANAGEMENT PROGRAMS IN SENEGAL

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This *retrospective* study is a reflection on the effect of technical assistance programs on Senegal's agriculture and natural resources. It is part one of a two-part study requested by the USAID mission in Senegal, under Contract Number LAG-I-00-99-00014-00, Task Order number 804.

This presentation is based on a review of documents and a series of interviews with key informants and practitioners, both past and present, in Dakar and in the field. A 10-day field visit to former and present project sites in the Fleuve, Ferlo, Dior, Saloum, Tambacounda, and Kolda zones of the country enabled the study team to see first-hand the current state of Senegal's resource base.

The study team received extraordinarily helpful and well-informed counsel and input from USAID/Senegal staff, and especially the Technical and Contract Working Group for Task Order 804. We extend our genuine thanks to each of the members of that group for their guidance: François Faye, coordinator of the Group and Agriculture/Natural Resources Management Specialist, SO2; Abdoulaye Barro, Strategy Objective Specialist, SO2; Abdrahmane Diallo, Sociologist, Analysis, Monitoring and Evaluation branch; Moribodjan Keita, Monitoring and Evaluation Specialist, SO2; Marie Claire Sow, Acquisition Specialist, SO2; and, Alpha Wade, Data Monitor, Analysis, Monitoring and Evaluation branch.

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Chapter 1: Introduction

1.1 Background to the Study

Senegal has long been recognized as one of America's most important partners in sub-Saharan Africa. Senegal is appreciated not only for its political stability, multiparty democracy, and moderation, but also as a key supporter of the United Nations charter on human rights, and for its contributions to United Nations and OAU peacekeeping operations.

But like many of its Sahelian neighbors, Senegal is also suffering the classic confluence of a declining natural resource base, a rapidly expanding and youthful population, and a significant and increasing level of rural and urban poverty. The impact of these three factors is worsened by decades of sluggish economic expansion and progressively unfavorable climatic conditions.

Despite the movement of the Senegalese economy away from dependence on agriculture and natural resources and toward more vibrant secondary and tertiary activities, it is estimated still that less than 20 percent of GDP accrues from agriculture. This, while probably in excess of 50 percent of the population relies on agricultural activities for their principal source of income and many more obtain some revenue from agriculture. With such a large sector of society reliant on Senegal's natural resource base, it is evident that the quality of that base is of overriding importance for their economic and social well-being.

The fact is that most natural resources in Senegal — regardless of region, ecotype, and climatic zone — are in dramatic and relentless decline. A plethora of studies during the past 20 years focused on both small and extensive areas bear this out. The most significant and comprehensive databases of evidence have been developed by the *Centre de Suivi Ecologique* (CSE), either working as a project of UNDP/UNSO (financed by DANIDA) or in partnership with EROS Data Center of the U.S. Geological Survey (financed by USAID). Chapter 2 of this report further details the natural resource base and its evolution over time, while Case Study 2 presents information on the CSE's environmental monitoring activities.

Since independence in 1960, Senegal has benefited from large international assistance programs derived from bilateral and multilateral donor agencies. These programs have targeted the improvement of agricultural production and the sustainable use of the natural resource base. Certain activities have led to considerable success, while others have been less successful. Yet a third category of activities have run predominantly counter to their stated objectives. Why particular interventions should prove successful and others have little impact or even detrimental effects is not always clear from reported activities and results. Considerable study and analyses are required to tease out pertinent lessons of failure or success and, in the process, learn from such lessons to plan better future interventions in the sector.

In an attempt to learn from past activities within the broad areas of agriculture and natural resources, the USAID Mission to Senegal and other donor organizations have begun developing key analytical studies of past interventions in the Ag/NRM sector. The current document contributes to this objective.

1.2 Mission Objectives

The current mission seeks to draw together reports and analyses of earlier initiatives and complement them with additional sector analyses — based on documentary review and interviews — before identifying the most pertinent lessons to be learned from past interventions. From that analytical platform, the study team seeks to capitalize on the most important lessons learned to help USAID/Senegal, GOS, and other development partners to plan for future Ag/NRM interventions in Senegal.

The key objectives of the study are therefore twofold: to 1) compile describe, review, assess, and where necessary update the literature review; and 2) develop innovative Ag/NRM alternatives based on the retrospective study and the definition of lessons learned.

The first component undertakes a retrospective study of Ag/NRM interventions in Senegal using key literature and sector review documents as well as other pertinent studies, reports, and documents pertaining to past and present interventions in the sector. The documentary information has been supplemented by interviews with key national and international players in the Ag/NRM sector, past and present, and by field visits aimed at witnessing firsthand the achievements and failures of selected NRM interventions. A 40-year time-line has been adopted, thus enabling both the history of post-independence development attempts in the sector to be documented and the major lessons learned to be defined. Emphasis has been placed on activities undertaken during the past 10 years because of easier access to documentation, institutional memory is likely to be more accurate, and the corresponding change in the state of the environment is better known.

The second aspect of the study uses the findings of the first to develop alternatives to support USAID in its policy dialogue with the GOS. It is oriented toward developing a more favorable policy environment and identifying possible future Ag/NRM approaches for USAID.

The prospective study will help USAID, GOS, and other interested partners capitalize on the lessons learned and impacts identified to plan for future Ag/NRM interventions. This work seeks to significantly increase the sustainable management of Senegal’s natural resources, thereby slowing the rapid resource degradation, to improve both the quality of life and the standard of living of the Senegalese population.

1.3 Methodology

The study methodology, designed to attain the two mission objectives, includes the following interrelated activities:

- Briefings with relevant USAID staff
- Reading and reviewing relevant studies, evaluation reports, and other reports
- Meeting with major donors active in the natural resources management sector (including World Bank, UNDP, FAO, GTZ, IRDC, Dutch Embassy, etc.)

- Meeting with GOS officials in ministries concerned with agriculture and the environment, and with national structures such as CONSERE and CSE

- Meeting with other partners and stakeholders operating in the Ag/NRM sector (e.g. FAFS, CDCR, project beneficiaries, etc.)

- Discussions with key resource persons not included above

A multitude of interventions have taken place during the past four decades targeting all aspects of the Ag/NRM sector. By studying the most relevant, the team was able to identify major trends (and frequently fashions) in government and donor activities, lessons learned from activities that have yielded both positive and negative results, and adaptive mechanisms that farmers and projects alike used to counter unforeseen events.

Several documents served as important complements to the team's work. Among the most important of the review documents were:

- "The Protection and Management of Natural Resources in Senegal" (van Dawen *et al*, GTZ)

- "New Directions and Old Lessons of Internationally-Financed Natural Resource Projects in Senegal" (Gonzalez, USAID)

- "NRM 'Limited Scope' Impact Assessment" (Christophersen *et al*, USAID)

- "Senegal Agriculture Sector Analysis Update" (Bucknall *et al*, USAID)

- "Senegal Agricultural Sector Retrospective Study" (Gadbois *et al*, USAID)

- "Impact Assessment of the Ag/NRM Strategic Objective of USAID/Senegal" (Lichte *et al*, USAID)

Of particular interest during the analysis were the issues of sustainability and replicability of key successes from Ag/NRM interventions. The team paid considerable attention to determining the degree of adoption, the role of gender, the integration of practices into daily activities, and the evolution over time of those practices, as well as their effects on the sustainable management of natural resources.

The following chapters of this report develop our findings in three sections. Chapter 2 presents a retrospective analysis of the major factors and activities that have occurred during the past 40 years (since independence) that contribute to the current state of natural resources and the environment of Senegal. These are presented over a 40-year time line, subdivided into time units that present the most significant political, social, and economic events that have occurred since independence. Their impacts on the rural population and the Ag/NRM sector in particular are discussed and analyzed. The analysis is supported by case studies that help explain the evolution of Senegal's natural resources over time and from which valuable lessons can be learned.

Chapter 3 provides an overview of the state of the environment and natural resources in Senegal. This allows the definition of the level of natural resources available to work with, and their problems and possibilities, as well as an assessment of the prevailing political and donor environment in which future interventions must operate.

The fourth and final chapter draws out the major lessons to be learned from these analyses and provides the foundations on which future interventions can be designed so that past successes can be replicated while failures and errors are not be repeated.

Chapter 2: Retrospective Analysis

2.1 Background to the Analysis

The purpose of this study is to describe, review, assess, and prioritize the lessons learned from stakeholders' assistance in the Ag/NRM sector in Senegal. This chapter details pertinent social, political, and economic changes that have occurred in Senegal, especially since independence, that have had an impact on rural development in general, and more specifically on the level of natural resources existing in Senegal.

To provide structure to the analysis, the report identifies characteristic and determinant periods in the history of Senegal. Documents analyzing these periods have varied their analytical emphasis: forestry policies (Gonzalez, van Dawen), agricultural policies (Gadbois), or the underlying macroeconomic framework (ISTI). In the present overview, the focus has been broadened to cover Ag/NRM development in Senegal in general, while retaining a specific emphasis on the impact of policies on the natural resource base and its ability to sustain economic activity including agricultural production.

Over the past 40 years, the government has enacted policy changes and institutional reforms that have seriously affected the nation's macroeconomic performance in general, and the agriculture and natural resources sector in particular. With regard to the most important policy changes and economic impacts, it has been possible to determine several important reference dates of political, economic and institutional importance and thus to develop a time-line of key events that help us to understand how the current state of the Ag/NRM sector has arisen. The timeline is developed below and is followed by a discussion of the evolution of decentralization of economic policies and agriculture, and of socioeconomic realities that together have culminated in SOPI (the call for change).

2.2 Timeline

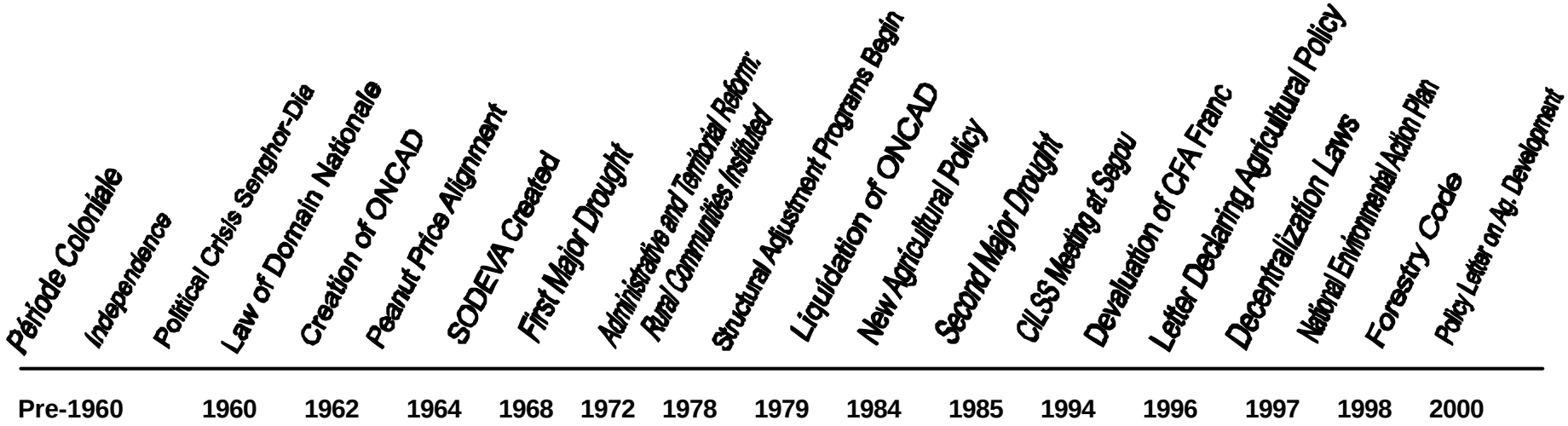
Among the myriad events that occurred between 1960 and the present (see Figure 1 on the following page) were three distinct periods, or turning points, that can be defined following the colonial period. These periods are grouped chronologically as follows:

- The colonial period (prior to 1960)
- 1960 to 1984
- 1984 to 1996
- 1996 to the present

2.2.1 Proposed Time Periods

Senegal achieved independence in 1960, a year that marked a point of economic departure. There was a shift from the trading economy established during the colonial period — characterized by an efficient, organized market for inputs and outputs, and focused on specific major cash crops — to the strong vertical integration of the state-dominated economy. The state controlled the

Figure 1. A Thematic Timeline Of Policy Development In Senegal's Agricultural And Natural Resource Management Sectors



Orientations and Policies	State domination/sectoral approach Focus on increased Production The "Golden Age" of Regional Development Companies (SDRs including SODEVA, SAED, SOMEVAC) Technical Services Minimized	Transition Uncertainty	Toward a "new orientation" : liberalization, globalization • Decentralized, participatory approach • Non-sectoral focus • Revision and Adoption of new laws, codes
Agriculture	Large sectoral projects Focus on subsector development, especially peanuts, rice, cotton, horticulture Institutional support at many different levels to ONCAD and the "Cooperatives", SODEVA, BNDS, SISCOMA, SIES, etc.	Farm policies "severed" Void left by abrupt disengagement	Readjustment of rural people and projects Self-organization of rural communities Increased importance of the role of NGOs Experiments with participatory approaches
Livestock	Livestock remained traditional Focus on increased meat production Project orientation (SODESP, PDSO, USAID/Bakel)	Same as for agriculture	Private extension (privatization of the veterinary corps) Intensification of livestock production practices (milk, meat, artificial insemination) Livestock largely remains traditional
Natural Resources Management	Military-style organization State-sponsored/controlled activities Reforestation efforts concentrate on roadsides and large plantations	Forestry focused on adapting to rural needs	Forestry focused on adapting to rural needs More integrated and participatory approaches
Financing	State, bilateral and multilateral assistance	State, bilateral and multilateral assistance	Bilateral and multilateral assistance Decentralized financing institutions Local collectivities
Markets	Government organized and controlled	Withdrawal of government intervention	Free market policies in effect

entire system, from the formulation to the execution of policies, throughout every stage of the commercial supply and distribution network that eventually was created.

The system worked reasonably well, especially from the state's perspective, through the mid-1970s. However, beginning in the late 1960s, climatic variations began to exert a downward influence on the agricultural sector performance. At about the same time, world market prices for Senegal's major cash crops started to experience severe declines. Senegal's economy, exposed to unfavorable terms of trade, began to incur sharp economic deficits. Declines in production, to some extent caused by poor rainfall (both quantity and distribution) during the growing seasons, caused many farmers to default on their loans. Eventually, the economic foundation eroded as the entire production and marketing system was disrupted by these declines. GOS found itself holding unpaid debts of around 100 million CFA francs in pre-devaluation terms.

From the farmers' perspective, the system of the time offered little room for optimism. Rarely was there enough of a surplus for the average farmer to avoid taking on debt before the next harvest was sold; this required the farmer to accede to the elevated interest rates offered by state-controlled operators through the officially endorsed commercial circuit or accept even higher short-term rates from local usurers. If, because of the vagaries affecting agricultural production, the farmer experienced one or more failed harvests, debts would rise, and this in turn engendered negative effects at the macroeconomic level. From the preceding discussion, it would appear that during years of unsuccessful harvests GOS was supporting the farm economy even as it failed. But in reality, farmers had for many years been supporting both the government and specifically urban areas of the country. During most of the post-independence era, virtually all significant investment was channeled toward the cities and little investment was made in rural areas, either in terms of infrastructure development, capacity enhancement, or in social investment.

A multitude of difficulties were encountered, leading to the dissolution of National Office of Cooperation and Development Assistance (ONCAD) in 1980. The state-owned marketing board had essentially served as the primary coordinating body in the agricultural economy since 1964, and its dissolution — in large part due to the inability of so many farmers to repay their debts — confirmed the void that had existed for several years before its formal dissolution. After ONCAD, farmers were essentially on their own to purchase inputs, sell their produce, and organize commodity transport. Most were unprepared or unable to respond in a manner that could enhance their livelihoods.

A New Agricultural Policy (NAP) was announced in 1984 that purportedly would resolve the lack of leadership that had become evident in the agricultural sector. The essence of the supposedly "innovative" NAP was to "empower" the population and permit subsector integration and "harmony" between farming, livestock grazing, and natural resource management. A critical failing was that empowerment was simply *declared* rather than nurtured. It also occurred in a policy vacuum because it was not accompanied by suitable measures to enable the *effective empowerment* of the farmers.

Farmers had virtually no training to assume credible authority over their affairs and lacked the logistical, organizational, or financial means — not to mention the minimal level of educational competency — to effectively administer complex systems they had never controlled before.

Also, there was no attempt to ensure that the private sector would fill the role of making essential inputs and credit available to the farmers, operations formerly assured by the state.

Further attempts to transfer authority from the central government to local communities were delayed until 1996 because the GOS was in the throes of dealing with problems stemming from the 1994 devaluation of the CFA franc. Twelve years after the announcement of the NAP, despite the clear inability of rural people to effectively manage either their local rural community structures or the network of agricultural commodities and services so essential to their livelihoods, the GOS dubiously decentralized authority over a set of responsibilities that formerly had been administered by GOS agents. The decentralization policy transferred more responsibilities to the rural people[1].

Importantly, this transfer had direct impact on the local management of natural resources because forest areas, with the exception of classified forests, were to be managed by the adjacent rural communities. Where more than one rural community shared these areas, the definition of responsibilities was not appropriately clarified. The transfer of decentralized authority did not include agricultural or livestock enterprises, the primary occupations of the rural population.

2.2.2 The Colonial Period

Senegal held an important position in the colonial economic system, which was structured according to the best way that each country could contribute to the benefit of France. Senegal's role was to grow peanuts, in much the same way that the Côte d'Ivoire grew coffee and the Asian colonies produced rice.

In agriculture, trade centered on peanuts. Everything in the system — from the inputs provided to the scheduling of the agricultural calendar — was oriented toward providing the most peanuts as possible. Governmental policies favored the traders, the intermediaries between the colonial administration and the producers. The administration responded as effectively as possible to the traders' requirements while the producers' needs were secondary, although the trading companies were careful to provide the rural people with the food they needed to tide them over between growing seasons. Of course, this benevolence came at a price. It was also during this period that the tradition of migrant workers from neighboring colonies (French Sudan — now Mali — and Guinea) began to supplement the local workforce. These workers benefited from many advantages when they came to work in the Peanut Basin.

Concerning the management of natural resources, and in particular forestry management, the policy of creating forest reserves was dominant. Forestry policy was oriented toward two principal objectives: first, to control the land by delimiting the areas reserved for farming and by creating areas for the exclusive use of grazing livestock; and secondly, along the Dakar-Bamako rail road, to create firewood reserves to provide fuel for the steam locomotives that still were in use at the time. To enforce these policies, a special forestry police severely penalized all infractions. During this period, only a few reforestation efforts were conducted, notably to stabilize dunes alongside major roads.

[1] See subsection 2.3 for a fuller discussion on decentralization.

2.2.3 From 1960 to 1984

During the first two years following independence, the entire trade economy was thrown into question. The new government, within the framework of the Cooperative Project espoused by the then Council President, promoted a more socialist orientation based on:

- Multifunctional rural cooperatives
- Planning from the village up
- Effective communication between all actors in the development process, facilitated by rural extension services whose interactions with the population began to pay off
- A set of grassroots funding and counseling systems addressed to the needs of rural people

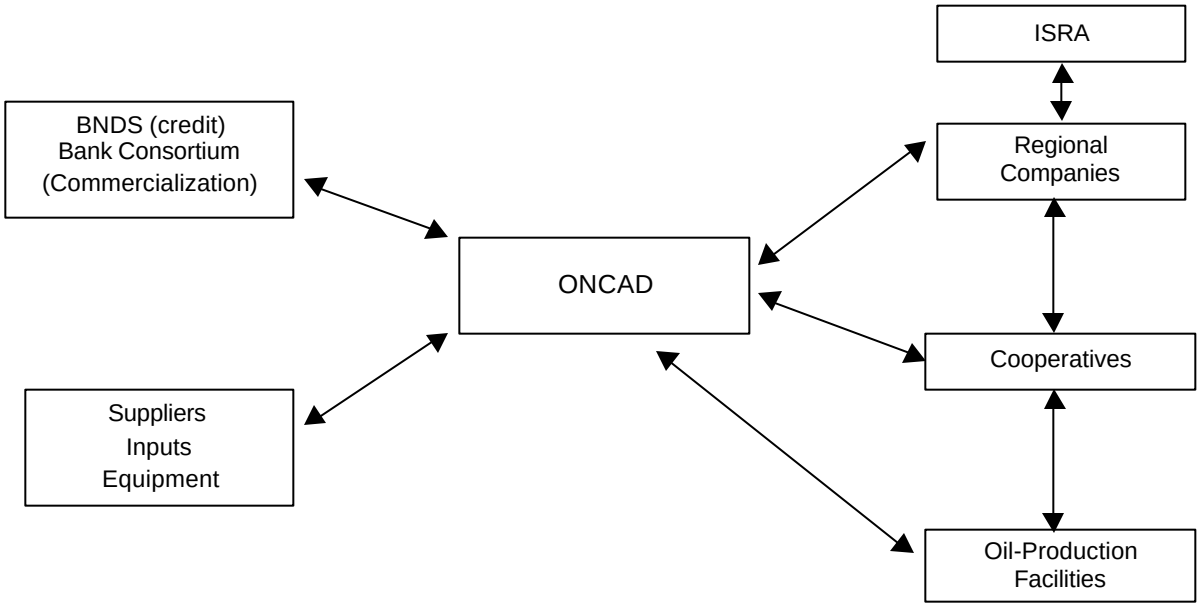
This approach was beginning to receive widespread support when the 1962 crisis occurred, a crisis that would characterize the subsequent period through the 1980s. In 1962, the first plan for social and economic development was instigated. This plan replaced a largely private sector system that worked toward increasing the capacity of rural people through an integrated rural development approach with a system that was grounded in administering every level of the economy from a central authority.

The 1962 crisis initiated a complete break and a new direction in Senegal's development strategies. The participative communication process was disengaged. The French technical assistance company, SATEC, was called on in 1964 to help farmers in the Peanut Basin. That was the beginning of a reorientation of the relations between the State and rural producers. SATEC's goal was to maximize productivity. In a very negative policy change, the people were excluded from the decision-making process, except for the most fundamental decisions at the producer level. The governing authorities used their political and administrative power to decide which programs and approaches to pursue. These then were turned into governmental programs administered by the government. A complex structure, as shown in Figure 2 on the following page, was set up to carry out the farm policy derived from the 1962 change that underwent several corrective steps before stabilizing.

The structure showed several operating levels, the most significant being:

- A coordination and intermediation function fulfilled by ONCAD that acted, in this context, as the central administrative structure.
- A financing function coordinated by the Senegalese National Development Bank (BNDS) that provided agricultural credit to farmers. A consortium of banks provided the financial capital for the peanut marketing operations.

Figure 2. Structure of Agricultural Policy, 1960-1980



- Agricultural materials and farming equipment were supplied by the Senegalese Industrial Farming Equipment Company [SISCOMA, currently the Senegalese Agricultural Equipment Company (SISMAR)]; the former Senegalese Fertilizer Company (SIES), now called Senegalese Chemical Industries (ICS), supplied fertilizer.

- Agricultural extension was provided by the Regional Rural Development agencies (SRDR): the Agricultural Development and Extension Service (SODEVA) in the Peanut Basin; the Senegalese Textile Development Company (SODEFITEX) which replaced the French Textile Development Company (CFDT) in eastern Senegal; the Casamance Development Company (SOMIVAC) in the Casamance; and the Delta Development Company (SAED) in the Senegal River Basin.

- Agricultural research was conducted by the Senegalese Agricultural Research Institute (ISRA).

- The local cooperatives, created at village or multi-village level, served to organize the cooperative members (producers), collect and market their produce, and distribute inputs to them.

- Peanuts were sold to regional oil processing plants.

Rural animation, a populist form of village mobilization and organization that played an important role until 1962, was practically excluded after the crisis. The traditional technical services and their local agents (agriculture, livestock, water and forestry, rural extension centers) also were marginalized in favor of Regional Rural Development Bodies (SRD), which

concentrated on extracting as much of a single crop as possible rather than on achieving balanced rural development.

The administrative system that was created and achieved its apex in the mid-1970s was the supply channel to rural areas for agricultural equipment, fertilizer, and other inputs. It also served as the main channel to market farm products. The extension approach was based on identifying a few farmers who could reasonably master the techniques involved and then encourage other farmers to use the same approach. Notable productivity increases were observed both for agricultural and veterinary techniques. A major success of this period was the wide-scale shift from manual agricultural practices to animal traction, resulting in substantially increased production levels.

Early on, the more cumbersome parts of the system began to exhibit signs of dysfunction: unattained objectives, and delays in accomplishing certain tasks. Because they were not involved in the decisionmaking process, rural people did not always do what was expected of them. As a result, there were unpaid or late debts or selective adoption of farming techniques rather than adoption of the entire technical package. Political and religious interference compounded these problems.

The system was more concerned, within the agricultural sector, with the development of peanut production at all levels. Performance was evaluated strictly on the amount of peanuts produced. This orientation weighed heavily on the production of food crops, which did not increase. A serious consequence of this singular orientation was that the safeguarding of the natural resources base was not taken into account.

Furthermore, livestock management practices did not undergo dramatic changes despite the actions of the Company for the Development of the Sylvo-Pastoral Zone (SODESP), the Livestock Development Project in Eastern Senegal (PDESO), and the USAID-sponsored livestock projects in the Bakel area. The livestock sector rejected modern approaches and retained its traditional character.

The series of droughts that hit throughout the entire Sahel beginning in 1972 harshly revealed the inadequacies of the system, but no corrective measures were taken to amend government policies in the sector. Only later, in 1978, were corrections made to the system, as part of the first Structural Adjustment policies implemented at the behest of the World Bank and the IMF.

In the early 1980s, the role of the state decreased in the rural areas. ONCAD was closed because of the high level of unpaid farmer debt compounded by the low world market price for peanuts; SOMIVAC came to an end; SODEVA and SODESP no longer had the means to continue their operations; SAED and SODEFITEX were retained but their scope was scaled back, allowing them to conduct only certain activities — a fraction of their former roles. All these agencies had successfully contributed to increased production levels, while climatic and economic conditions remained favorable. However, all had failed in some way: ONCAD was unable to implant a viable indigenously based cooperative movement led by informed, literate cooperative members; and while SODEVA effectively trained farmers to use packages of technical skills, it was unable to help them become better organized or technologically independent.

The abrupt withdrawal of state management and guidance resulted in disorder and malfunction within the rural sector. It was aggravated by the damaging effects of a series of droughts; the cut off of the supply of agricultural equipment and inputs; disruption in the marketing network; and, correspondingly, drastic cuts in production.

Furthermore, throughout this period, no significant attention was paid to natural resources management (NRM). In the extension efforts conducted by the Regional Development Agencies, some extension themes were related to land improvement (e.g., the Ten Commandments of SODEVA) but they were in reality focused more on intensifying production. These themes, which included reforestation and low-till plowing, were not well accepted at the adoption level. Additionally, the Forestry Service conducted the following NRM-related activities:

- Declaration of forestry reserves and forestry policy enforcement (police actions)
- Under state control, large-scale regimented actions were conducted (1975-1981):
  - Dune stabilization on the Western Coast between Dakar and Saint-Louis
  - Reforestation (plantations) with Eucalyptus at Bandia
  - Reforestation (plantations) with Teak and *Melina* in Casamance
- A remarkable soil enrichment operation, through assisted soil nutrient regeneration
- Use of *Acacia albida* (1968-1970), which received an enthusiastic response from rural people and gave promising results in the central Peanut Basin

When the state could no longer afford to pay salaries or other incentives (distribution of oil and other foods through partnership with the World Food Program) for village-level tree planting operations and fire-prevention committees, the continued monitoring, caretaking, and protection of the plantations that had been established was threatened.

A broader view of rural forestry was encouraged during the first phase of the FAO forestry projects:

- PRECOBA in Fatick beginning in 1980
- PROBOVIL in Louga and Bakel beginning in 1984
- PREVINOBA in Thiès beginning in 1984
- PROGONA in the Senegal River Valley beginning in 1984

These projects began to open the dialogue between Forestry Service agents and local village populations. However, only a few of the agents were trained in the “new” participatory methodologies and their mastery of agroforestry and extension techniques tended to be weak. As a result, although the projects targeted promising themes — e.g., natural regeneration and plantations that were small enough to be managed by local people — the themes were not presented coherently and effectively because the agents did not have the proper extension skills to transfer the information to the villagers.

The Senegal Reforestation Project (SRP), funded by USAID, also espoused this "rural forestry" approach. It worked with individual "entrepreneurs" and provided substantial financial incentives that were accorded based on the survival rate of trees after one year. This short-term perspective, and the accompanying financial inducements, proved to be unrealistic and ineffective, and the necessary maintenance of the trees planted was largely neglected in subsequent years. The people who had planted the trees — who in many cases did not reside near where the trees had been planted — retained no interest in maintaining the trees after they had been paid. Many of the trees did not survive longer than a single year, though it is not possible to give an exact percentage. The SRP approach provides a clear lesson in what should not be done to encourage participatory Ag/NRM activities. Paying outsiders based on an unsustainable formula proved to be as wrong as it seems illogical[2].

PASA developed village-level cashew tree plantations in the Kaolack and Fatick regions. Although this was an interesting effort from the standpoint of agroforestry and did contribute somewhat to increasing revenues for some people, on a broader level the results of these exercises were minimal both from the ecological and economical viewpoints.

On the whole, this period was marked by often large-scale reforestation operations in different forms (sand dune stabilization, soil enrichment with *Kadd*, village woodlots), that in certain cases produced relatively good results. However, inadequate or nonexistent monitoring hampered the success of these efforts and accordingly the results were compromised. In many cases, the reforestation activities were carried out by people who lived in areas distant from the villages where the trees were planted and who planted the trees on a contractually paid basis. Local populations were often not involved in either the tree planting or caring for the trees after they were planted. The absence of local participation and implication in the effort clearly diminished the chances of success, and the consequent failure of many of these efforts followed suit.

More troubling during this period was that the degradation of the natural resources base continued. The pace of degradation accelerated due to increasing demographic pressures that both stimulated a greater intensity of tree felling for the manufacture of charcoal as well as increasing the demand for land for cultivation. Little was done by any of the projects to effectively educate the local people in conservation techniques. Limited efforts were initiated to identify ways to conserve wood use, especially as a source of domestic energy (e.g., the development of the Casamance charcoal kiln and dissemination of improved cookstoves). In 1981, PDDF initiated a planning process, an early effort to search for solutions to the many problems that were beginning to be recognized.

2.2.4 The Period from 1984 to 1996

This period was marked by the declaration of a more global approach linking agro-pastoral activities and natural resources for the first time in an official document. The New Agriculture Policy (NAP), announced in 1984, sought to give more responsibility to rural people, in large part in response to problems caused by drought, the disengagement of the state, and macroeconomic changes instigated by the earlier Structural Adjustment Programs.

[2] Gonzalez (1992) provides an especially detailed critique of the SRP approach. See especially pages 47-52.

These efforts were strengthened by new strategies being promoted throughout the subregion that favored an integrated participative approach to rural development and came out of conferences held in Segou in 1985 and Praia in 1986, among other things. In Senegal, these participatory strategies were not translated into observable successes through integrated actions in the field. Rather, rural development continued to emphasize specific sectors, without considering their relation to other sectors and with little regard to seeking balance between sectors when conflicts arose.

In agriculture, massive investments were made in the south and north to ensure food security for these zones. The central Peanut Basin, an area with high population density, received far less investment. The subsector approach for peanuts, rice, and cotton continued to accentuate production and reinforced the pre-existing networks that previously had failed to produce better living standards for the producers and their families. Technical support, through extension and other technical agents, was reduced and even eliminated in many areas (e.g., the Peanut Basin and the Casamance).

Livestock breeders fared slightly better. The Project for Improvement and Increased Productivity of Animal Breeding (*Project pour l'Amélioration et la productivité de l'Elevage*, or PAPEL) helped ensure an available and motivated corps of technical service providers (private veterinarians), implanted in zones with significant livestock production. The motivated technical agents present in rural areas were vastly different from what producers in other agricultural economy sectors were facing.

The combined effects of the state disengagement, drought, and the devaluation of the CFA Franc, among other influences, prevented many development efforts from achieving their targeted results. One reaction to this was that local initiatives began to spring up with the help of NGOs, village development associations, economic interest groups, and groups promoting the economic and social welfare of women. These initiatives focused on production, but in some cases, they began to promote limited NRM activities.

Because of the continuing and by now perceptible degradation of the natural resource base, large-scale NRM projects grew out of already existing projects at the village level (FAO) while new projects were developed to address these problems at the rural community level (for example, PGCRN and PAGERNA). The Diourbel Agroforestry Project fell somewhere between the village and rural community-level interventions.

The focus of the new generation of projects was on ensuring active participation of the local populations. Indeed, beneficiary groups were directly involved in problem identification, choosing alternative solutions, carrying out activities, and follow-up. New forms of organizations were developed and entire programs were conducted to train and create awareness among participants.

These projects obtained mediocre results in response to the overall natural resources problems prevailing in Senegal, in part due to their limited scales of intervention. However, the participative approach began to yield more promising results. On the research side, NRBAR, in partnership with several NGOs, began to develop a collaborative research program.

2.2.5 The Period from 1996 to the Present

Laws 9606 and 9607 created local collective entities (regions, municipalities, and rural communities) and transferred nine activities to their control. These laws marked an important step in the relationship between projects and the people they were intend to serve. This is especially true in the area of NRM.

Portions of the natural resource assets of communities were included in the activities transferred to the decentralized control of local authorities. Projects with a NRM orientation have justification to involve the Rural Community Council directly, or through the council's Environmental Commission. The need to reinforce civil society is even more pronounced now that rural communities have custodianship over a portion of their resources. The participative process, begun in the mid-1980s, has expanded and incorporates the broad involvement of rural people in Ag/NRM programs.

The gap between agriculture, livestock, and natural resources continues to grow, however. In agriculture and livestock management — both technical areas that were not transferred to local control — the sector approach has been retained. This situation may change once ANCAR finally is implemented, as technical expertise in these two areas will be locally assigned through the offices of ANCAR. With regard to NRM that is a transferred responsibility, local populations participate in programmed activities. However, uncertainty remains because the state retains control over classified forests. Additionally, to the extent that more than one rural community may share a common resource area, there is a potential for conflict. Without clear demarcation of boundaries and definitive statements of shared and individual responsibilities, the potential for miscommunication will remain strong.

Further, the scale of positive results attained in improving NRM practices remains small. Some progress has been made to promote awareness in selected rural zones. The introduction of effective solutions continues to be hampered by the search for effective and appropriate methodologies. Traditionally, Ag/NRM projects have tended to be based on rigorous objectives, but the beneficiary groups continue to be confronted with problems of daily survival. They do not always have the time, patience, or luxury to reorient their behaviors to favor a more sustainable, environmentally friendly approach. Indeed, there is evidence that greater adoption of NRM practices frequently occurs in response to severe declines in natural resources, rather than preemptively from the wish to avoid future declines[3]. Clearly, short-term palliatives are essential to demonstrate that Ag/NRM problems can be resolved; successful tackling of the simpler problems may give rural people some needed incentive and encouragement to pursue longer-term solutions. These problems remain to be consolidated in the project-planning phase for future interventions.

In addition to identifying appropriate and effective NRM practices, projects face the problem of selecting the level of intervention most appropriate for their approach: the village, the supra-village, or the rural community. The proper intervention channel at the level of a supra-village or village presents an additional important decision to project personnel. At the local level, no ongoing process exists for determining the most effective approach. Rural councils, the guiding

[3] Philip DeCosse (1998) pers. comm.

forces of the decentralization reform, are ill prepared for identifying the most indicated partner since they are grappling with organizing many communities, each with its own set of priorities (see Chapter 4 for detailed discussions on these and related topics).

The natural resources base continues to degrade within the context of a broader socioeconomic decline (see Chapter 3). This critical situation increases the societal demand for poverty-alleviation support. A few programs aimed at mitigating the effects of poverty have been implemented, predominantly through the World Bank, but have had little obvious effect. The trend toward increased poverty is visible and is exemplified by:

- Redistribution of the population in major centers (Dakar, Touba, M'boro, M'bour, Richard Toll, and the zone near Kolda)

- Strong pressure on the remaining natural resource base, especially through demand for charcoal and firewood gathering

- Skyrocketing growth in the urban areas where more than 40 percent of the population now reside as city dwellers and thus contribute to the already poignant problems of the cities — housing, transportation, security, and sanitation. They also contribute to accentuated demand for charcoal and firewood as sources of domestic energy.

During the period under review, the issues of coordination of problems common to agriculture, livestock, and NRM were also raised. This provided the necessary impetus for the development of a National Environmental Action Plan (NEAP). The process took place between 1993 and 1997, and was spearheaded by CONSERE, with considerable financial support from USAID. Once the NEAP was prepared, the mission to follow though on the NEAP fell to the CONSERE itself. The plan was unable to be translated into action because this structure lacked the necessary political support and funding, once USAID financial support ended. The importance of indigenously funding such activities on a permanent basis cannot be stressed strongly enough.

2.3 The Processes of Decentralization

The idea of granting authority to local people over aspects of their social, economic and political lives came into being with law 7225 of 19 April 1972, that created the rural communities, and the decree applying that law, 72 1288, transferring the following responsibilities to the rural councils:

- Assignment of land rights for the zone in which the rural council holds authority
- Protection against predators
- Fighting bush and forest fires
- Management of water resources
- Oversight for agricultural activities in the zone
- Co-management, with the sub-prefect, of the Rural Council budget

This first step toward a policy of decentralization took place in a context where most activities were centered on the regional development agencies and ONCAD, both of which were focused

on maximizing agricultural production. Leaders of the rural communities were preoccupied with the political and economic aspects of this relationship. Additionally, they were not well informed or trained on how to apply the laws governing rural communities. While the rural community institutions were being set up, the focus was on buildings for their activities: community meeting halls, youth and women's centers, etc. In contrast, developmental responsibilities of rural council members and economically important procedures were not addressed. A correction was made several years later by turning over direct control of the community budget to the Rural Council, but this did not bring about decisive changes.

The New Agricultural Policy of 1984, although intended mainly to allow the state to disengage from agricultural production and marketing activities and to stimulate transfer of these activities to the private sector and producers, also signaled an early move toward decentralization. Unfortunately, the private sector and the producers were not adequately prepared to adopt their new roles and thus to take charge of activities that the state had given up.

A decisive step was taken in 1996 toward more effective implementation of the decentralization policy in Senegal. For rural communities and municipalities that already were in existence, law 9606 added a local collective entity at the regional level. Law 9607 transferred nine areas of authority to the local collective entities: land use management, planning, urbanism, education, health, youth and sports, culture, environment, professional training, and employment. Following the devaluation of the CFA Franc in 1994 and the problems the state faced in managing development, the time was right for the GOS to transfer the heavy costs and responsibilities associated with these nine areas to local communities. The transfer was accompanied by the promise of an annual payment to the community by the Public Treasury to create a fund for the community to carry out some activities.

Decentralization created a dynamic atmosphere within the local communities as they became aware of their new responsibilities. This was especially visible in the elected representatives at the regional and municipal level, where counselors were more aware and better educated. It was less visible in rural communities where rural counselors were unable to understand the implications of the new laws and decrees. The authority of the state remained strong because of laws and rules that imposed the "technical agreement" of the state in the application of rural community decisions for specific cases, including NRM.

In addition to these constraints, authority over key development areas was not transferred. That was the case for agriculture and water resource management. The much-sought coherence in the definition of national development policies, as well as their application in the rural areas, could not realistically be achieved because of conflicting policies.

Local collective entities did not have the financial wherewithal to achieve their often-ambitious programs. They relied on projects that supported the decentralization process and on decentralized cooperation coming from such programs as sister cities and solidarity agreements. Too often, the tendency was to incur expenditures for construction of community buildings rather than to invest in processes that would advance local development and generate earnings (return on investment).

In the area of natural resources — a transferred authority — the interest of the community leadership varied by zone. In areas where the forest cover had been severely diminished, little interest was accorded to NRM. However, in zones where there was genuine competition for use of natural resources between local people and outsiders, rural community leaders frequently became very involved. One notorious and perhaps best known example is Kelkom, although many other areas of competition and abuse exist such as in the southern Ferlo and in the *Acacia nilotica* forests of the Senegal River Valley. Often, local leaders' interest in their natural resources were not to ensure their rational management but rather to obtain financial resources to shore up their small budgets.

Despite these constraints, decentralization has become a fact of life and occupies an important place in describing Senegal's political and institutional environment. To this end, the legislative documents and rules (such as the Forestry Code and the Water Code) and projects (such as PAGERNA) have begun to adapt their methods to achieve broader conformity with the decentralized processes, especially in NRM. Future involvement in the Ag/NRM sector must be prepared to work hand-in-hand with the decentralized authorities.

The planning process under a decentralized administration. Under Senegal's decentralized administrative structure, a system of separation of powers was instituted.

Responsibilities were accorded as follows:

- The legislature was empowered to vote bills into law
- The executive branch was empowered to implement governmental policies as defined by the President of the Republic
- The judicial branch was empowered to control the way laws and rules were applied

Local communities (regions, municipalities, rural communities), even though elected by popular vote, are decentralized bodies that have been delegated certain powers by the state (environment, land-use planning, social and economic planning, city/town planning, education, health, cultural affairs, youth, and sports).

Governing institutions exist at national, regional, and local administrative levels. The dynamic linkages between them can be characterized as follows:

1. The Socioeconomic Development Plan (PDES), created by a law passed every six years by the National Assembly, is one of three stable planning tools. The other two are the Prospective Study for Long-term Planning (available until 2025) and the Triennial Priority Investment Plan (PTIP) that translates the PDES' objectives into programs and projects for the 10 regions of Senegal. These sets of programs/projects are implemented through an investment budget determined on an annual basis, called the Consolidated Investment Budget. Other plans relevant to national and regional development have included:

- The National Plan for Land Use Management (PNAT), created through a project financed by USAID and UNDP, has not been updated since the 1980s, something which should be done on a regular basis. The absence of an operational context for this plan limits the ability of administrators to effectively resolve problems.

- Sectoral plans have been developed and are used by the World Bank and other donors as the basis for their policies and program efforts.

- At the regional level, the regional offices of Planning and Land Use Management prepare Regional Integrated Development Plans (PRDI).

- For most *Communautés Rurales*, the only planning document is the Local Development Plan (P.L.D.) drawn up by the Rural Extension Centers (C.E.R.) in 1986. In those *Communautés Rurales* where projects are active, a Land Use Management Plan (LUMP/PAGT) is developed with the active participation of community residents. However, once the plan is developed, problems arise because projects tend to focus only on activities that coincide with the project's objectives.

2. Communication and coordination between planning levels theoretically occurs through:

- Cabinet meetings at the ministerial level
- Interdepartmental meetings between technical staff of specific ministries
- Regional Development Commissions (CRD)
- Departmental Development Commissions (CDD)
- Local Development Commissions (CLD)

Coordination is an unresolved issue that needs to be reexamined by the government and donor community. At the applied level, the theoretical aspects of these structures fall short. There is a tendency to focus on problems that are most urgent and to recommend actions that are not effectively monitored.

3. Although Law 9607 transferred responsibility for local planning to the local level (regions, municipalities, and rural communities), administrators at that level lack the experience to effectively implement the planning process. Therefore, they depend on either the national planning authorities or on projects for both technical and financial support in the planning process. The same lack of expertise holds true for many deputies (elected representatives) in the National Assembly with respect to their ability to analyze laws, budgets, planning documents, and other legislation. The result is that, at all levels, there is inconsistency, even incoherence, in the planning process, resulting in ineffective design and implementation of local plans.

4. In implementing policies and plans, there is more inconsistency, which continues to favor control by public authorities over local will. At the applied level, despite the theoretical transfer of responsibility to the local level, there are exceptions where technical authorities reserve the right to overrule local councils.

- *Forestry Code* — For example, in NRM policy, although legislation clearly grants local structures responsibility for their resource base, approval must be sought from the Forestry service before any forestry resources can be extracted.

- *Law 9607* — Decisions taken by a rural community sometimes must be approved by regional authorities for some kinds of economic activities, such as forest-related activities.

These safeguards are included by legislators to discourage excessive use of the resource base by undisciplined local authorities. However, if this limit exists — which it does — and if local technical agents have a tendency to hold on to the control that historically has been their prerogative, these safeguards effectively provide such agents with the authority to continue to exercise that control over the wishes of the rural community. The result is that decisions tend to be weighted toward the public authority rather than the local authorities.

5. The National Environmental Action Plan (NEAP/PNAE) was developed using a participatory approach. Under the guidance of the CONSERE, departmental studies were conducted, summarized at the regional level and then presented to the regional authorities. Regional analyses were combined into a national-level document that was discussed at a national conference to amend and approve the NEAP. The resulting document, NEAP, was then to be implemented under coordination of the CONSERE, a structure that would normally have evolved into an institution with the status of a foundation. The development of the NEAP was substantially financed by USAID. However, when the document was completed, USAID financing stopped as did most of CONSERE's activities. Since the CONSERE was expected to coordinate environmental policy in addition to having the statutory role of harmonizing various sectoral laws, codes, and decrees, as well as spearheading the natural resource and environmental sector, its lack of functionality has resulted in a serious lack of coordination of environmental policy.

   The informal donor group on natural resources also exists but works only as a conduit for information and serves no real coordination role. The issue of coordination came up repeatedly in discussions between the team and many prominent people in the Ag/NRM field. Several measures could be taken to rectify this lack of coordination:

   - Adoption of a program approach, e.g., of the type developed by Eaux et Forêts and Dutch Cooperation (this topic is discussed in detail in the Prospective Report)

   - Reactivation of the CONSERE, with the condition that it be entirely funded and placed within the national government and accorded an appropriate level of authority

   - Preparation of a priority action program, using the NEAP as a reference, which gives effective operational guidance to the coordinating agency (i.e., CONSERE)

The coordination problem is a standing question that needs to be reexamined and resolved by the Government and the donor community.

Lessons Learned

1. Although decentralization is in principle the best available mechanism to deliver democracy to the regions and remove total decision-making from Dakar, it still requires considerable nurturing and education of regional leaders in order for the true benefits of decentralization to be felt at the community level.

2.4 Economic Policies and Agriculture: A Cause-and-Effect Perspective

The Senegalese government followed a post-independence agricultural policy that remained state-centered until the declaration of the New Agricultural Policy in 1984. Under the state-run system, regional agricultural development agencies provided technical assistance to farmers to produce "lucrative" cash crops, notably peanuts and cotton, which in turn were sold through state-owned marketing boards.

Using profits from commodity sales on the world markets, the state invested primarily in urban areas, predominantly Dakar and Rufisque. This investment was used to develop urban infrastructure or to subsidize products used primarily by urban consumers. This appeasement of the urban population would turn out to have serious adverse consequences by, in effect, encouraging rural exodus to urban areas. The failure to reinvest in agriculture is a hard-learned lesson to draw.

Senegalese farmers have shown they are willing to invest in expanding their production and that they are price responsive. Throughout the 1960s and into the drought-affected 1970s, these farmers used available credit, offered to them through state-controlled agencies, to expand their use of animal traction techniques. This increased agricultural intensity and led to higher yields. Farmers also responded to price levels by favoring peanut production when prices were relatively higher and traditional cereal crops when peanut prices were less advantageous.

In the late 1970s, farmers were offered relatively higher prices to stimulate their production of peanuts. They responded by producing more, but neither they nor the state reinvested capital to strengthen their farming enterprises. The reduction in fallow practices, and the more intensive utilization of the land resource, brought about declining yields and, correspondingly, declining farm incomes. This encouraged farmers to further increase their land under cultivation by bringing fragile fields into production, only aggravating the situation. Fertilizer was available, but prices were set at levels that did not encourage effective use of that input. In most instances, fertilization levels were insufficient to offset the accrued effects of over-production.

Perversely, greater production capacity coupled with higher peanut prices also led to higher rates of erosion of the natural resources base. Fields formerly left fallow to benefit from natural regeneration were now placed into production to take advantage of the greater capacity offered by animal traction. Additionally, farmers were advised and paid to remove trees from their fields to remove obstructions that interfered with the passage of the animal-drawn farm equipment.

The devaluation of January 12, 1994, significantly changed life for the average Senegalese. Effectively doubling the relative price of all goods imported from outside the CFA franc zone, the devaluation also made Senegal's own products more competitive in the domestic and regional markets. The irony was that there were few such products. Indeed, much of what the

Senegalese consumed was imported. In the short term, rural people fared somewhat better than urban people. Eventually there were pass-through effects, which made economic life difficult for everyone. Coupled with processes that had already been placed into motion beginning with the New Agricultural Policy, it became clear that rural Senegalese were left to fend for themselves. This period has been called a "void" with respect to programs that were directed to farmers.

Also, as a result of the devaluation, imported chemical fertilizers attained price levels that made them unaffordable to the vast majority of farmers. The government responded by encouraging the use of indigenous rock phosphate; however, farmers were being asked to invest their own scarce financial capital in mid-term solutions that yielded no visible short-term benefits. Since the incentive reference for most farmers is fixed in the short-term, and since the accompanying publicity campaign was very limited, the program was not widely adopted. Furthermore, the farmers were requested to purchase the phosphate, something that was beyond their capabilities in an environment characterized by low savings rates, falling yields, and rising prices for staple goods. Where the state had once offered a range of production factors and credit mechanisms to farmers, after its pullback, no private institution or enterprise stepped in to respond to the farmers' needs. The void seemed more pronounced.

In addition to the economic circumstances that were rocking the farmers' world, various other factors combined to further marginalize the once-bountiful production of the Senegalese farmer. Traditionally agile and able to adapt production methods to meet short-term circumstances, such as droughts, unusually heavy rains, or shortages of critical inputs (such as seed), farmers found themselves faced with a range of negative factors: declining soil fertility, advanced erosion from wind and rain, poor rainfall distribution, declining robustness of seed stocks, decreased availability of soil amendments, aging farm equipment, increased population pressure competing for limited land resources, among others. Additionally, the surrounding natural resource base was being threatened as once arable land became infertile through excessive erosion or leaching of the soil through salt intrusion. Arable land in Senegal is estimated at only 19 percent of the total 3.8 million hectares available. The regional distribution varies greatly however (see Table 1 on the following page)[4].

From a high of 1.4 million hectares of land planted in oilseed peanuts in 1975-76, a steady decline in land under cultivation in oilseed peanuts reached a record low, only slightly more than 550,000 hectares in 1998-99, significantly below any year since independence. Yields have declined to levels as low as 1 ton/hectare, far below what effective farmers were producing under better climatic and support conditions. As an example, oilseed peanut production in 1998-99, the lowest level in 10 years, was only 39.5 percent of production in 1975-76.

In response, land has been taken out of production in some zones because of its inability to sustain viable agricultural production. In some cases, flight from rural areas to other less-crowded areas or urban milieus has caused major perturbations in the structure of traditional

[4] It should be noted that the agro-ecological zones that were used in the study from which Table 1 was extracted, although very similar to the zonation chosen in Section 3, are not identical. The zonation used in Section 3 were selected from several possibilities by the authors as providing the most homogenous zonation types when considering both the agricultural and ecological characteristics of Senegal. In contrast, the zonation used in Table 1 are much more closely allied to agricultural characteristics than ecological ones. Nonetheless, the two zonation types are almost totally interchangeable.

Table 1. Agricultural Land Use by Eco-geographic Zone (x 1,000 ha)

Type Of Production	Casa-mance	Senegal Oriental	Peanut Basin	Sylvo-Pastoral Zone	Senegal River Valley	Niayes	Total
Rain-fed agriculture	297.8	161.5	1,748.9	107.8	40.0	17.2	2,372.2
Irrigated agriculture	1.2	0.8	0.6	-	60.0	6.4	69.0
Flood-plain agriculture	-	-	-	-	30.0	-	30.0
Land under cultivation	299	162.3	1,749.5	107.8	130.0	23.6	2,472.2
Land not cultivated	451.5	237.7	419.2	42.2	170.0	12.6	1,333.2
Arable land potential	750.0	400.0	2,168.7	150.0	300.0	36.2	3,804.9
% of national total	20%	10%	57%	4%	8%	1%	100%

Source: "Annuaire sur l'environnement et les resources naturelles du Sénégal," CSE/Ministère de l'Environnement, Mai 2000, p. 180; adapted from Plan Céréalier, DEL/L Berger et al, "Plan d'Action Foncier," 1996.

Senegalese society. Farmers are concentrating their production on food crops, which require fewer soil amendments. Production is being diversified as farmers turn to mixed horticulture and livestock enterprises, where possible.

Lessons Learned

2. Farmers, as elsewhere in the world, are prepared to invest time and money in agriculture providing that returns are sufficiently high. However, when farming conditions decline, many farmers are prepared to abandon their cultivation and join the rural exodus toward the large population centers.

2.5 The Socioeconomic Impact of Policy Reforms

A major policy change began in 1980 with the first structural adjustment measures. With regard to agricultural policy, this led to a reduced role for the state, resulting in a lack of personnel in many areas.

In fact, with the dissolution of the Societes Regionales outside of the SAED (Senegal valley) and SODEFITEX operational zones (Tambacounda and Kolda), and the scattered coverage of projects and NGOs, many zones suffered from the lack of development activities. The relevant state services in this area — the CERP or rural extension services — remained largely dormant. As a result, the capacity of these organizations diminished. These structures also no longer had access to resources. Their involvement in extension activities technical assistance became non-existent.

After the dissolution of ONCAD, the rural communities no longer received agricultural materials and inputs. The private sector preferred to invest in other areas than agriculture, such as real estate. This was a result of the history of non-payment of debt in the rural sector. Agricultural equipment is currently dilapidated and barely adequate, despite the best efforts of blacksmiths. However, with mechanization and continued agricultural extensification, farmers are always in search of new lands. The lack of fertilizers encouraged the use of organic material as natural fertilizer. Although organic fertilizer has long been part of the farming system, under these circumstances it assumed a major importance. Composting is widespread.

Relationships between credit organizations and farmers have always been strained. The credit organization responsible for peanut seeds (Sonagraine), fertilizer, and equipment (CNCAS) are not able to recover their debts due to drought and poor debt repayment by farmers. This situation is worsened by the fact that the farmers are accustomed to the government absorbing their debts. This results in a tense and often accusatory relationship between the farmers and credit organizations, with a mutual lack of understanding. The lack of inputs, together with deteriorating equipment. has led to the drop in agricultural production. This situation was aggravated by the drought, exposing the frailties of existing agricultural production systems. The devaluation briefly boosted production only to see it drop again later.

Only export crops, such as cotton and peanuts, benefited from state-supported intervention. For cotton, Sodefitex has an extensive production network allowing it to supply its ginning factories and textile mills. For peanuts, part of the production is collected by the cooperatives and private buyers for Sonacos to supply factories at Kaolack, Ziguinchor, Diorbel, and Dakar (accounting for a third of their output). The remaining part is lost to the parallel market in Touba mainly to supply Mauritania, where it is sold as seed immediately before the winter season.

Horticulture and rice production operates in a more liberalized context. This liberalization worked at two levels. The commercialization of rice was liberalized upon the elimination of the Caisse de Perequation et de Stabilisation des Prix-Price Adjustment and Stabilization Office, the state organization that held a monopoly in the area. Horticultural product commercialization — onions and potatoes — was also liberalized. These products can be imported year round while in the past, they were imported only at the end of the national horticultural season starting in August.

In contrast, monopolies were maintained for fertilizer with ICS and in agricultural equipment with SISMAR. The high cost of fertilizer and agricultural equipment is explained by these monopolies. In addition, the development of irrigation systems dependent on pumping equipment accounts for higher costs of rice production in the valley of the Senegal River. Production factors have elevated costs and are reflected in agricultural product prices, especially in horticulture and rice. Under these conditions, rice, potatoes, and onions cannot compete with similar imported products cultivated on a large scale that not only are cheaper, but subsidized.

Given the impact on prices, this monopoly issue is critical to Senegal’s agriculture and must be dealt with as part of an immediate restructuring of the national economy.

Impacts on rural populations. The problems of input supply and agricultural equipment, commercialization, and diminishing natural resources have important repercussions on rural populations. These include:

- Rural households continue to become impoverished: 57.9 percent of households are below the poverty line.
- Staple food supply is threatened. Very few households are able to last for a period of six months on their millet harvests. For the remainder of the year, they must resort to buying rice with external revenues.

- Clothing and education requirements, and health expenses cannot be adequately met under these conditions. Priority is accorded to basic survival.

- Money lending, with equipment used as collateral, is widespread, especially among men. This deepens the poverty of the average farmer, bringing wealth to a minority class of commercial farmers.

Rural flight is increasing. In the past, the exodus was principally from the regions of Saint-Louis, Thiès, Diourbel, and Fatick. Now it is widespread throughout the countryside. The resultant influxes to urban areas have created their own problems in unemployment, transportation, lodging, and security.

Rural flight has now taken on an international dimension, as populations depart the major cities for countries such as Italy, United States, Cote d'Ivoire, and Gabon.

This emigration has particularly affected struggling regions such as Djambour (surrounding Louga), Baol (in the Diourbel region), and Cayor (surrounding Mekhe). While emigrants often return considerable sums of money into the regions that they leave, the fact is that the regions are left with a deficit of able-bodied individuals and become more and more dependent on continuous monetary transfers from abroad.

Where emigrants have succeeded overseas, the regular transfer of money has benefited home families in Senegal, which have been able to invest in improved housing and living conditions, regular water and electricity supply, and better balanced and more regular meals. Increasingly, investments are being made in certain natural resource management practices, such as the construction of small dams. The countryside has been modified in many places along the river as a result of emigrant investments.

Striking contrasts exist between families who have members living abroad and those who do not. Increasingly, success depends less on the domestic situation and more on the period of time spent outside of the country. This fact is so well-established that politicians and *marabouts* reinforce it by involving themselves in the search for expensive visas that drain a good part of a family's modest income. It is further reinforced by the educational level of students who have high expectations that cannot be satisfied by present conditions in rural areas. Families encourage their young women to marry young men who have settled abroad. Many development projects become subverted for political gains. One should also recognize that there are few youth-directed initiatives (either in towns or the countryside). Those remaining in rural and urban situations soon become discouraged and disaffected. With no opportunity for employment, there is increasing involvement in protest movements, including political and religious movements.

The marked rural exodus also has demographic consequences, as young men and women emigrate, leaving behind the elderly and the very young. This brings into sharp relief the problem of agricultural labor in regions where there has been a heavy rural exodus and international emigration (such as the peanut-growing valley and basin of the north and east).

Traditionally inhabited regions are losing their populations, in part to regions in the south and east, where they attempt to establish the way of life they have known in the Peanut Basin. Others choose to move to urban areas and overseas. Fallow land that results from the rural exodus benefits migratory pastoralists and agriculturalists during the dry season.

One consequence of this situation has been to further increase the already deep level of involvement of rural women in production, often through formal (GIE) or informal associations. Many initiatives have been developed in concert with Decentralized Financial Structures (DFS) or using their own funds with the aid of revolving credit. According to the region, these activities include vegetable gardening, livestock fattening, grain processing, and petty commerce. Revenues from these activities are used for food and household expenses, including health and education. This situation consolidates the position of women in the socioeconomic fabric, a position reinforced by literacy programs that target women. In general this has led to a greater appreciation of women's roles by men, although this is resisted in certain areas.

Adapting to change. Despite the many problems, there has been a movement to adapt to these changing circumstances. Although limited, there has been a trend toward a more entrepreneurial mind set among certain groups. There is also a trend toward diversifying and intensifying agricultural production, which could potentially contribute to an eventual reorientation of Senegalese agriculture.

In the Senegal valley, as a result of massive investments, irrigated rice growing is increasing. Historically, Senegalese rice has competed from a position of weakness with low-quality imported rice. The cultivation of tomatoes is also developing and supplies the factories of SNTI (in Dagana) and Socas (in Ross Bethio). Onions are becoming a major crop in the middle valley but compete with onions from Gandioulais and imported European onions, which arrive on the market at the same time.

The Niayes remains the largest horticultural region and relies on the markets of Dakar, Thies, Kaolack, and Touba. This prolongs horticultural activity in the zone of Sebikotane where, through the strengths of BUD Senegal, a horticultural belt focused on the exportation of fresh plants is developing. Dairy farms have developed, concentrated in the region of Dakar-Thies. The number of poultry farms and fruit farms, growing mangos and mandarin oranges especially, have also increased.

In the Anambe basin, with the support of Sodagri in project management and consultation, 2,500 hectares of rice are cultivated by producers organized into GIEs and into zonal units delimited and served by a water-pumping station.

Livestock fattening is solidly established along the Thies-Touba corridor. The processing of local millet and millet coming from Saloum is becoming the principal activity of women’s associations. This is linked to livestock fattening and soil enrichment (through fertilization using waste material from farms). Other zones are being reoriented through the cultivation of manioc (Thies-Mekhe) and fruit trees (Petite Cote).

The example of Keur Momar Sarr's farm illustrates the development of Bas Ferlo. It exhibits an integrated approach, including pastoral and environmental elements as part of the production system. It is also a model for horticultural development.

Small farmers such as Ndene Diouf (N'Gane-Gandiaye) provide an excellent example of combining rain-fed agriculture with market gardening and fruit tree production in intensive and innovative ways.

The success of projects and NGO initiatives has been variable. There are scattered success stories that show that production and market problems are beginning to be solved. Different activities are being developed: market gardening, livestock fattening, improved access to markets. They are also developing technical expertise through training, integrating natural resource management into production systems, and developing infrastructure, such as wells and mills.

Although traditional agricultural systems still predominate in Senegal, these new methods and technologies need to be understood and taken into account in developing agricultural policies.

The vast majority of farms in Senegal are traditional family farms. But we are also witnessing a greater stratification of lands according to local and regional specificities. As a result of an increasingly monetized economy and an opening of the rural sector to the outside, youth are becoming more independent, leading to more independent households. This also explains the rise of certain independent activities derived from traditional agricultural systems, notably in arboricultural activities (fruit and cashew trees), small market gardens, fattening operations, and small businesses.

Outside of these examples, which are linked to more traditional activities, independent private enterprises do exist, using basic resources (land and equipment) and essentially supporting subsistence lifestyles. The larger enterprises, using large areas of land (> 50 ha) and new technology, are the exception. However, they can be a catalyst for the development of modern agriculture. There are four types of agricultural farming in Senegal:

- Family farms
- Small agricultural enterprises linked to family farms
- Small independent agricultural enterprises
- Large agricultural enterprises

It is not clear how important these groups are in agricultural policy development. The CNCR feels that family farms must be *le point d'ancrage* for all policy. ENDA-SYSPRO and the Mission d'Amenagment des Vallees Fossiles, through the farm of Keur Momar Sarr, are trying to promote irrigated agriculture to a point where youth have an opportunity to choose. They believe this approach can help promote development of new methods in agricultural production.

Two options determine current government policy. The first is based on small traditional farms, as exemplified by the project financed by the World Bank. The second is the large agricultural project being developed by ENDA-SYSPRO and governmental services.

In spite of a difficult agricultural situation dating back 20 years, promising, adapted approaches and methods are beginning to be seen in Senegal. These include adapted natural resources management strategies, especially for water and soil fertility management, and cultivation of non-traditional crops, etc. These need to be encouraged while also promoting new activities in the rural sector, in the areas of commerce, craft industry, and small businesses.

Lessons Learned

3. The social consequences of past policy decisions need to be addressed as urgently as does the decline in the natural resource base. This means that economists and ecologists must work hand in hand.

2.6 Political-Institutional Realities

Sopi: An opportunity for real change. With the outcome of national elections in early 2000 and the resulting change in the country's leadership, the voters of Senegal formally signaled that they are ready for change. Indeed, the incoming government campaigned on a theme of "*Sopi*!" (Change!). While the Senegalese wait for the new government to detail planned changes and their implementation, agriculture and natural resources are almost certain to be among the key factors in the new government's strategy.

Senegal's agricultural and natural resources sector is threatened by numerous factors, chief among them the 1) increased human and animal population pressure; 2) cumulative effects of wind and water erosion that combine to reduce soil fertility; 3) lack of credit for farmers to purchase capital and chemical inputs for intensive production techniques; and 4) limited access to markets for agricultural produce. In spite of the liberalization policy adopted since the 1980s, access to markets for agricultural produce has been limited due to insufficient infrastructure (roads, storage space, specialized warehouses, markets). This, coupled with increased prices for imported goods instigated by the 1994 devaluation, have combined to dramatically impact the lives of rural Senegalese.

So dramatic, in fact, has the impact been that the language spoken by those in the development community has changed in just a few years from the "battle against the drought" to the "battle against desertification" and on to the "battle against poverty." Indeed, according to the 1994 Senegalese Integrated Household Survey (ESAM), 3 in 10 households were living at levels below the poverty threshold, and 3 of every 4 of those households were in rural areas.[5] More recent figures, from a 1996 survey[6], indicate even higher levels of poverty. The indicators used to measure poverty might not be entirely appropriate, but the fact that the dialogue is pursued with credibility is in itself a disturbing sign.

Rural poverty induces migration toward urban areas. Once in the urban environment, the former rural inhabitants increase the demand for food and firewood, which in turn places further stress on the natural resource base. In rural areas, increased populations, spurred by a 2.7 percent growth rate, and decreasing prices for farm products, create conditions in which farmers cultivate marginally productive land. This increases damage to the ecosystem. Under these circumstances,

[5] The World Bank, "Project Appraisal Document…for a National Rural Infrastructure Project," December 1999, p. 81.
[6] The World Bank, "Taking Action to Reduce Poverty in Sub-Saharan Africa: An Overview," 1996, p. 6.

fallow has all but disappeared, the use of soil amendments has greatly diminished, and agricultural productivity has declined. Agriculture, as a percentage of GDP, fell below 20 percent in 1997 and fell to 17.4 percent in 1998. This occurred despite the fact that more than 60 percent of the population[7] lives in rural areas and much of the population in rural areas — indeed, in many urban areas as well — is primarily employed in agriculture.

Government, pulled this way and that by varying donor demands and requirements, has seemingly lost its ability to lead. The resulting policies are characterized by incoherence and inconsistency. Partial analyses lead to "unforeseen" negative effects after only a few years. This action-reaction type of planning needs to be reconsidered on a fundamental level. A programmatic approach, which includes comprehensive macro and micro-level analyses, is one measure that can be adopted. Most essentially, the government needs to provide direction to the multiplicity of actors operating within the country.

Lessons Learned

4. The Senegalese people have shown politicians that they are ready for change, and that such change must occur rapidly but sensibly if the economic, agricultural, and natural resources situation in the country is to be improved to their satisfaction.

[7] The World Bank, "Project Appraisal Document…for a National Rural Infrastructure Project," December 1999, p. 81.

Chapter 3: State of the Environment and Natural Resources in Senegal

3.1 Background

Senegal is a well-studied environmental entity, frequently held up as providing one of the classic case studies for the onset of desertification in Sahelian West Africa. But such overarching opinion must be tempered by considerable reflection and reference to the enormous body of supporting and contradictory evidence that exists in the literature.

In the authors' opinion, Senegal is not suffering true desertification; rather, it suffers from unsuitable practices leading to a staggering and unsustainable increase in pressure on its natural resources. This, in turn, is generating environmental degradation (but not, *as yet*, desertification) on a massive scale. The one bright note to sound from this opinion is that while desertification is, by definition, almost impossible to reverse, degradation potentially can be countered, providing the political will and the full cooperation and participation of rural populations can be ensured. The dramatic increases in vegetation production in the Ferlo in the years following the severe droughts of the mid-1970s and 1980s support the degradation rather than desertification theory. The work of EROS Data Center and the CSE in comparing the change in habitat quality between the early 1980s and the late 1990s at approximately 350 field sites across Senegal underlines the rapid environmental degradation the country is suffering[1].

Senegal's problems cannot be resolved by a "one solution fits all" approach. A relatively small country in the African context (approximately 200,000 km^2), Senegal nevertheless is composed of different eco-regions, passing from dry, short grassland Sahelian savanna in the north to dense or semi-dense forest (Soudano-Guinean) savanna in the south. In between is a gradient of vegetation types that bridge the two extremes. Further, most of the country is either encircled by fresh or salt water, which dramatically modifies the adjacent zones while allowing a viable commercial fishing industry to develop. Extensive agricultural exploitation in the west and southwest of the country adds to the complexity of the situation.

Not surprisingly, the pressures on the environment vary considerably from zone to zone, people to people, and particularly since decentralization, from the reaction of one local management committee to another. To understand the evolution of Senegal's natural resources — at least during the past 20 years — and draw out pertinent lessons to learn, all factors must be taken into account. This analysis will permit the eventual development of proposals aimed at better, more sustainable management of natural resources and the environment. This will constitute a major step toward the rehabilitation of those resources and a more rational utilization of the land surface of Senegal.

[1] USAID has sponsored the production of a very revealing PowerPoint demonstration of habitat change that can be viewed at the *Centre de Suivi Ecologique* entitled "Natural Resource Monitoring in Senegal (1998).

Lessons Learned

5. It is generally considered that the decline in natural resources in Senegal represents intense, mostly human-led, degradation rather than real desertification. This provides some hope for future interventions in the sector.

3.2 Agro-ecological Zones

The literature contains many attempts to subdivide Senegal into a logical series of zones based on such features as agro/geo/eco-types, forest types, and ecosociological regions. Each position has its strong and weak points; none is totally convincing, but we feel that the current document is not an appropriate forum for debating the merits or shortcomings of each.

Instead, we propose to use the ecogeographical zonation adopted for the "Impact Assessment of the Ag/NRM Strategic Objective of USAID/Senegal (old SO2)"[2]. This decision was taken to provide analytical consistency and to use a zonation already known and accepted by much of the development community (see the map on the next page). Each region has its own environmental problems, pressures, and characteristics, and each has been subjected to Ag/NRM activities over time. To understand what the activities seek to achieve and what remains to be achieved, it is necessary first to look more closely at zonal characteristics, pressures, and problems.

The map shows the country subdivided into 13 zones, but closer examination reveals that Senegal can be divided into 7 general regions (8 if the Dakar conurbation is included). The seven zones are as follows:

- Areas heavily influenced by intense agricultural activities (the Peanut Basin and extensions into the Saloum and eastwards to Kaffrine)
- The pastoral region or *Ferlo* — predominantly Sahelian savanna
- The forested regions of Casamance, Kolda, and Kedougou (predominantly Sudan or Sudano-Guinean savannas but based on different geological features)
- The transitional zone (predominantly degraded Sudano-Sahelian savanna) lying between the Sahel and Sudan-Savanna types
- The Senegal River valley
- The Niaye Zone or "Grande Côte", a narrow but extensive region between Dakar and Saint-Louis composed of sand dunes and inter-dune valleys
- The Estuarine region encompassing two large delta regions — the Sine-Saloum and the Western Casamance, zones largely dominated by mangrove swamps

[2] Lichte, J.; McCormac Wild, C.; Christophersen, K.; Hadj, A.; Winterbottom, R.; DeCosse, P.; Wild, P.; Marks, M. & Bah, O. (1999). Impact assessment of the Ag/NRM Strategic Objective of USAID/Senegal.

The boundaries between zones are neither distinct nor stable. Rather, there is a general transition from one zone to the next and in general an ongoing tendency for zones to be degraded into a less resource-rich type.

To these zones must be added inshore and offshore zones that provide a rich source of halieutic products. Tragically, resources off the West African coast (including off Guinea, Guinea-Bissau, The Gambia, and Senegal) are being decimated by indiscriminate and illegal industrial trawlers from Europe and the Far East.

The seven zones are described in detail in the following subsections.

3.2.1 Peanut Basin

The region encompasses the colonial-period Peanut Basin and its more recent extensions to the south (into the Saloum) and east (to Kaffrine and toward Tambacounda). The epicenter of the Peanut Basin has been exploited since the mid-1800s; almost the entire zone has been brought under cultivation. The soils have also been stripped of almost all vegetation cover and virtually no fallow is practiced. This has exposed the soils to intense wind (especially in the north) and water erosion (in the south). While the value of certain tree species has been recognized (mostly *Acacia albida* in the north and *Cordyla pinata* in the south), their relative scarcity within fields (rarely exceeding 5 percent of cover[3]) has done little to prevent the erosion of topsoil or contribute to the maintenance of soil fertility. Historically, the trend in the Peanut Basin and Saloum has been toward large, open fields, unhindered by trees and easier to plough and harvest (the influence of past agricultural mechanization programs — promoting the use of animal traction — must take much of the blame for this tendency). Soils in this extensive and important agricultural zone have become impoverished and this, together with falling rainfall, rising cost of chemical fertilizers, and cultivation of marginal lands, has resulted in a significant decline in crop productivity.

Three major impacts have resulted:

- Populations have been forced to readopt and integrate into their farming practices traditional Ag/NRM practices to attempt to raise productivity — a positive, if rather late response.

- There has been significant migration away from traditional agricultural lands toward the "new-lands" offered by such regions such as Kolda, Tambacounda, and the Western Ferlo (see box on the next page). This invasion of nontraditional farming lands, predominantly by Wolof and Serère, has been heavily promoted by the Mouride Brotherhood, often with negative impacts on the local population and their natural resources (see also "Competition for Limited Resources" in the subsequent section). The colonizers can be seen as transplanting their harmful agricultural techniques into the new land with the same disastrous consequences being reproduced.

[3] Marks, M.K. & Faye, A. (1990): Report of 3rd aerial survey: landscape monitoring, CSE Publications, Senegal. Marks, M.K. & Faye, A. (1990): Report of 4th aerial survey: landscape monitoring, CSE Publications, Senegal.

The Case of the Forest of Kelkom

The declassification in 1991 of the Forest of Kelkom[4] at the favor of the leader of the brotherhood is perhaps the critical turning point in the controversial issue of agricultural invasion of new lands. Indeed, the reverberations of national and international displeasure stimulated by the act are still being felt. This event was given the blessing of the government of the time and was assisted by the Forestry Service. Its eventual effect was to show clearly that government had resigned from its commitment to environmental protection and metaphorically open the floodgates to the unhindered agricultural and charcoal exploitation of forests, some classified, in the regions of Tambacounda and Kolda (discussed in detail later) and the Ferlo. In environmental terms, this action can only be viewed as one of the most critical and negative decisions ever taken by the Senegalese government. Although few would argue that the forest was not heavily degraded and did not play the generally accepted role of a classified forest, it nonetheless acted as a buffer between agricultural activities in the Peanut Basin and pastoral activities in the Ferlo. This was indeed the logic behind its original classification during colonial times. Attempts, *à posteriori,* to develop land development plans for Kelkom only served to illustrate the lack of thought that went into its declassification.

It is unfortunate that all the manpower and effort that went into clearing the major part of Kelkom was not instead targeted at improving Ag/NRM practices in the Peanut Basin itself.

- There has been significant abandonment of farmland, particularly within the northern and central Peanut Basin, with a rural exodus toward large towns (especially Dakar and Touba) or overseas. Paradoxically, this is giving rise to an increase in fallow land and the extension of livestock grazing back into some areas of the Peanut Basin.

Also on the Ag/NRM side, apart from the presence of leguminous trees in fields, there is also the widespread practice of manuring (*parcage*). Studies of livestock densities[5] have determined significant livestock concentrations in the zone following crop harvesting. The natural transformation of crop residues into manure contributes to improved soil fertility. Other Ag/NRM practices have been adopted, including live hedging, windbreaks, village woodlots, nursery techniques, field tree planting, composting, adoption of improved cooking stoves, etc. However, generally such practices are not adopted to *maintain* agricultural productivity but rather to *respond to its decline* (perhaps with the exception of the traditional integrated cropping system of the "Petite Côte" Serère). This opinion is borne out by the significantly fewer Ag/NRM practices being put into practice in the newly cultivated areas of the east of the country by contrast to the west.

Whatever the logic for the adoption of Ag/NRM practices, certain trends are clear from recent analyses of eight years of KAP studies[6]. Comparative surveys were not carried out in the more northern parts of the Peanut Basin. However, sufficient information was collected from the regions of Fatick and Kaolack to show that there have been steady increases in the rates of adoption of several classic Ag/NRM practices, both individually and in combination, during the past five or six years.

[4] See for example, Schoonmaker Freudenberger, Karen (1991): M'Bégué: The disingenuous destruction of a Sahelian Forest. In: Development Anthropology Network, Bulletin of the Institute for Development Anthropology.

[5] Faye, A., Marks, M.K. & Prévost, Y. (1989): Survey of the density of livestock and their distribution in the North of Senegal, 1987-1989, CSE Publications, Senegal.
Faye, A. & Marks, M.K. (1990): Report of 5th aerial survey: livestock monitoring, CSE Publications, Senegal.

[6] DeCosse, P. (1999): Assessment of Natural Resource Management Changes in Senegal in the Period 1992 to 1998 from the Knowledge, Attitude, and Practices Surveys. IRG/EPIQ, USAID/Senegal.

Although classified as a zone of intense agricultural activity, this region shows little evidence of intensive agriculture, with recent yields of peanut and millet struggling to exceed one ton per hectare. In fact, it bears more hallmarks of an extensive agricultural system, including:

- Few land management techniques (e.g., inadequate tenure, farms of small size)
- Too little regard for maintaining soil fertility (e.g., insufficient trees, little if any compost or manure applications, paucity of fallow)
- Near absence of crop diversification (peanut and millet dominate, although toward Kébémer considerable manioc is cultivated as well as *niébé* (local white beans); there is little market gardening (horticulture)
- Insufficient utilization of anti-erosion devices (e.g., windbreaks, live hedging, gully plugs, *cordons de pierres,* and strategically placed tree plantations)
- Few water management devices, although water is often cited as the most important problem throughout the zone (e.g., absence of irrigation, nonutilization of *zai* holes, few water retaining barriers or micro-dams)
- Low investment of time and money (i.e., the soil is being exploited, not nurtured; cultivation and land care activities occur only for a few months a year)
- Almost total absence of agricultural intensification; few inputs are being used, and even use of improved seed varieties is declining

Counter to the accepted definition of extensive agriculture, there is a critical lack of available land. As a result, low-fertility fields are kept in cultivation rather than being abandoned, as would occur in a true extensive system.

The contribution of this zone to Senegal's GDP is declining rapidly and the trend is unlikely to change in the near future. It will not regain importance unless community leaders (including central and decentralized government and technical services, as well as religious leaders) can dramatically influence the farming population to reorient agricultural techniques. They must also ensure that improved agricultural practices are tied to the mass adoption of sustainable natural resource management practices.

The zone contains few areas with significant levels of biodiversity; either in terms of fauna or flora.

Lessons Learned

6. A zone of intense cultivation, the Peanut Basin also bears many of the hallmarks of an extensive agricultural system. This paradox is unsustainable and unless sound land husbandry techniques are adopted on an enormous scale, the zone will continue to witness an unhindered decline in productivity.

7. The falling productivity of the zone coupled with reductions in average farm size are causing increasing numbers of farmers to migrate to other regions of the country.

3.2.2 The Pastoral Region — The Ferlo

This is the main pastoral region of Senegal, with a low-density human population and considerable numbers of mixed livestock herds. The human population is composed both of small sedentary groups based on boreholes (with year-round water supply) and transhumant groups who remain with their herds away from the boreholes for as long as freshwater is available in seasonal swamps, ponds, and valley bottoms (basically July through November). Until the 1950s, the Ferlo was a naturally protected area since the lack of permanent water sources restricted access of grazing herds to just a few months of the year.

However, during the 1950s the colonial government opened up the entire Ferlo to year-round grazing by the implantation of a significant number of boreholes. This has resulted in a more complete use of grazing lands, on the one hand, while on the other condemning the pastures to considerable and continual overgrazing and degradation, especially in the vicinity of boreholes. Indeed, one school of thought recognizes boreholes as epicenters of desertification, and strong evidence supports this conclusion (see box below).

Testing the Hypothesis That Boreholes Encourage Vegetation Loss And Desertification

NDVI data (a measure related to the quantity of green vegetation) was used to test the common hypothesis that boreholes lead to vegetation loss and desertification in rangelands. This was done using composite images from the NOAA satellite covering the Ferlo. Images were taken for several years in the late 1980s and early 1990s. East-to-West transects were traced through those NOAA pixels where boreholes had been known to be operating for at least 30 years. NDVI data were then extracted from the individual (approximately) kilometer square pixels for up to 20 km on either side of the borehole pixel. Data were plotted as graphs and the null hypothesis tested that NDVI should increase with distance from the borehole, i.e., there should be less vegetation as boreholes are approached. In reality, very few boreholes respected the hypothesis; many showed no significant difference with distance, and several actually showed a significant and positive increase in NDVI as the boreholes were approached from either direction. This challenge to the hypothesis was investigated further by field visits that, while confirming the NDVI observations, served to reveal that the vegetation colonizing the sites around boreholes was atypical of rangeland sites since it was composed of noxious, weedy species more typical of abandoned agricultural fields. This vegetation, while being ignored by grazing livestock, was benefiting from reduced competition with rangeland species and receiving significant manure applications[7].

The Ferlo sits astride two major geological features that influence considerably the ecology and desirability of each zone. To the west is the sandy Ferlo that produces relatively significant pastures of annual, sahelian grasses such as *Eragrostis tremula* as well as suitable forage tree species such as *Acacia nilotica* and *Balanites aegyptica*. These are the favored grazing lands of the traditional Peulh herdsmen, especially at the start of the rainy season. Unfortunately for them, the more southerly and easterly regions are viewed as attractive potential agricultural land and are drawing a considerable and sedentary agricultural-based population from the neighboring Peanut Basin, with migration again being influenced greatly by the Mouride Brotherhood. Conflicts are frequent between agriculturists, seeking to protect their crops, and herders who find their traditional grazing lands usurped and transhumant routes blocked. Herders are being forced further eastward to the curassic Ferlo, a zone with inferior grass production and less favorable fodder tree species (such as *Pterocarpus lucens*). Furthermore, the hard surface formed by the lateritic soils is less favorable for livestock grazing. This zone has also suffered significantly

[7] Hannan, N., Prevost, Y. & Diouf, A. (1991): Assessment of desertification around deep wells in the Sahel using satellite imagery. Journal of Applied Ecology, 28, 173-186.

from the severe droughts of the early 1970s and 1980s. Whole plains of dead *Pterocarpus* exist with little evidence of natural regeneration. Furthermore, the hard curassic surface causes a very significant reduction in annual herbaceous production[8] and further diminishes its suitability for livestock.

Another factor arising during the past seven years casts uncertainty on the future of the Lower Ferlo as a key livestock rearing area. This is the decision to reintroduce water to the fossil valley of the River Ferlo and therefore encourage the agricultural development of a zone stretching from the southern end of the Lac de Guier almost to the town of Linguère in the east. Too little time has passed since the flooding of the valley to draw conclusions about the likely effects. However, it has been reported that the quality of grazing is improving and herders are satisfied with the year-round presence of freshwater for their herds. Also, the experimental irrigation farm at Keur Momar Sarr reveals an encouraging picture of the horticultural potential of the zone. However, land conflicts are inevitable and government is taking steps to avoid problems by including pastoral activities and information campaigns into its program, "Mission d'Etudes et d'Aménagement des Vallées Fossiles" (MEAVF).

The agricultural encroachment from the south and west, and the development of the fossil valley to the northeast is progressively reducing the area available to traditional herding populations. Resource conflicts are already occurring and are only likely to increase as population and other competitive pressures increase. Some efforts are being made to safeguard the herders' traditional ways of life, since it is recognized that they are competent land managers and tend not to overexploit their natural resources. One effort financed by the ADB is PAPEL. This program has begun to set up pastoral zones that seek to encourage greater sedentarization of herds and herders within individual zones by according a degree of resource ownership. The system is having some success but will certainly break down during years of poor pasture production.

Large areas of the Ferlo are composed of sylvopastoral reserves that, in principle, are in place to protect the pastoral habitat. Certain areas possess significant levels of biodiversity, especially floral resources, but no significant populations of large mammals exist with the exception of Wart-hogs (in the south and toward the River Valley), Gazelles, and Jackals. In contrast, the zone boasts diverse avian populations[9], especially passerines, hornbills, and game birds as well as counting one or two small populations of Ostrich (to the North of Ranerou and on the Ranch of Doli).

Lessons Learned

8. The sylvopastoral zone has traditionally seen few changes in land husbandry techniques over the past 40 years, with most of the population involved directly or indirectly with extensive grazing.

9. However, recent eastward agricultural expansion from the Peanut Basin is causing land competition between grazers and farmers, giving rise to territorial conflicts. Such conflcits will multiply unless political solutions are put in place.

[8] For example: Diouf, A., Diallo, O. & Marks, M.K. (1990): Comments on a vegetation production map of Senegal: rainy season 1989. Biologie-Géologie 3, 527-532.

[9] The University of Cheikh Anta Diop and the University of Copenhagen, Denmark have been carrying out studies on avian populations since approximately 1993. Journal of Applied Ecology, 28, 173-186.

3.2.3 Casamance and Kedougou

The Casamance provides a mosaic of vegetation types with mangroves lining the west of the region and occupying the delta of the Casamance River. Much of the rest of the region is composed of valley bottoms, where rice and vegetable cultivation is common, and the surrounding, marginally higher land where rain-fed agriculture and tree formations are frequent. Several classified forests are present in the region with, for example, Kolda counting the Forests of Pata, Mahon, and Bakor.

The rice production regime has experienced ongoing problems, particularly of salt intrusion. Many projects and programs have been initiated during the past 30 years that have sought to reclaim saline paddy soils. Among these are ILACO, Projet Rizicole de Sédhiou, SOMOVAC, PIDAC, DERBAC, and SZWM (Southern Zone Water Management) project. Water retaining dykes and salt reduction methods have enabled considerable areas of paddy to be reclaimed and put under cultivation. Also, techniques tried and proven in the Casamance are now being reproduced in other salt-damaged areas, e.g., in the Departments of Nioro, Fatick, and Kaolack.

The zone from Kedougou and northward to Bakel sits on the geological Shield, a region of higher rocky outcrops. This area is also well wooded with rain-fed agriculture being the predominant means of food production. The relative difficulty of access to many regions and consequently the higher transport costs have until now served to protect significant areas of forest and the lifestyle of the indigenous populations. However, increased road access is now opening up this area to exploitation of its natural resources.

Although Casamance and Kedougou are two of the most beautiful regions of Senegal, only extremely limited areas of natural vegetation can still be viewed in pristine conditions. It is here that conservation and resource management efforts should be making a stand to secure the remaining natural resources for future generations. However, the window of opportunity

The Charcoal Dilemma

The forests of Kolda and Kedougou, and to a lesser extent those of Tambacounda, until recently have been protected from excessive exploitation by their distance from the burgeoning resource demands of Dakar, especially for household energy. However, historical failures to manage sustainably the forests of Bandia, Kaolack, Kaffrine, and through to Tambacounda has turned exploitation inevitably to the resources of Kolda and Kedougou. Since independence, the Forest Service has failed to regulate forest resources exploitation in a logical and sustainable manner and must be held complicit in their decline. Even today, when it is clear that the remaining forest resources have little time left, archaic quota systems are still in use that depend not on area exploited but on the number of sacks of charcoal extracted. Where is the need for production efficiency in such a system and how can this be termed good resource management?

Decentralization of resource management, although good in theory, presupposes that local authorities have the competence and will to manage their resources in a sustainable manner. Local authorities can theoretically call on regional forest services for advice, but given the continual and rapid decline in forests – classified or otherwise – this probably happens only rarely. The dilemma is worsened by the economic power of the charcoal lobby that can use its political and financial clout to strengthen its grip on forest resources. For an underfunded rural community, the temptation to strengthen the local budget by signing away local forests must be great. However, this is to the great detriment of tomorrow's resource base.

Attempts are being made to slow the destructive processes, such as the introduction of more efficient charcoal ovens (e.g., the *meules casamançaises*), improved cooking stoves, more rational forest management (e.g., through the activities of PROGEDE), and the planting of sustainable plantations. Sadly, use of charcoal as the primary source of domestic energy has been reinforced by the recent, shortsighted IMF requirement that subsidies on cooking gas be immediately removed (the economic implications are reviewed elsewhere). Unless charcoal consumers are forced immediately to pay the real environmental cost of their energy, an economic, social, and energy crisis must be anticipated in the near term when the forest resources run out.

is rapidly closing: at the current rate of forest destruction, particularly in Kolda but also in Kedougou, the forested environment risks disappearing in as little as three to five years. The construction of the national road through Nikolo Koba is opening up this vitally important park to illicit exploitation. The loss of the forests will have catastrophic environmental effects in lost biodiversity, degraded lands, and silted rivers, as well as severe social and economic impacts. The boxes in this section, entitled "The Charcoal Dilemma" (see previous page) and "The Agricultural Colonization of the Forest of Pata" (see below), detail the menace posed by two highly destructive processes that are radically changing the forests of Senegal.

Nikolo Koba is the remaining site in Senegal where large mammal populations can still be seen in quasi-natural situations. Of interest in the Park are lions, leopard, hippopotamus, several members of the deer family, monkeys, hyena, as well as small mammals such as civets. There are also frequent reports of the presence of a few elephants that apparently move in and out of the Park from Guinea. The WWF has been an active supporter of Nikolo Koba. Furthermore, by

Agricultural Colonization of the Forest of Pata

Just as the migration of agriculturists has occurred from the central Peanut Basin to the edges of the Ferlo and into Kaffrine, so has the migration of significant numbers of farmers from the Saloum into Kolda. Similarly, many of the migrants, as members of the Mouride Brotherhood, are being induced to colonize these new lands under the instructions of religious leaders. Although Pata has not yet been declassified *de jure*, anarchical forest clearance visible in a trip through the zone shows that vast tracts have been *de facto* declassified. The resident population is already significant and is likely to increase rapidly. Village leaders openly stated that they have sent messages back to Saloum that there is plenty of forested land available for colonization.

The indiscriminate destruction of the forest and agricultural colonization is being compounded by the fact that the cultivation habitats of the Saloum – proven in that location to be unsustainable – are now being imported to Pata and surrounding areas. Scant regard is being paid to the value of trees. Indeed, several farmers told us they constituted a nuisance, casting too much shade and impeding cultivation. In a short trip we saw hundreds of mature trees, including *Cordyla pinnata* and *Pterocarpus erinaceous,* being ring-barked and fires built around their bases. Extensive agricultural practices have taken hold in Pata and will prove extremely difficult to dislodge, especially if they continue to be ignored.

Apart from the wreaking of environmental damage, there is also a potential for real social conflict. We heard firsthand from Pata villagers that conflicts have already started between the new arrivals and the traditional herdsmen because the latter are finding their traditional pastures usurped. It was reported that the agriculturists are deliberately setting bush fires at some distance around their villages to keep out the herders and diminish the chances of conflict.

Long-time residents of Pata have responded by calling in forestry agents, which has reportedly led to up to 250 agriculturists at a time being jailed for forest violations. However, we heard that as soon as one person is locked up, "… his brothers and friends take over cutting and burning the forest. There is going to be conflict very soon." The dilemma of anarchic forest destruction and the introduction of an extensive cropping system were the recent subject of a newspaper article that called on a rapid government response[10]. Tragically, the prophesy of conflict proved correct with a report from Kolda that one person had been killed and eight wounded in a conflict involving guns and machetes[11].

Local community rural leaders, forestry agents and the central government appear unable to respond adequately and have apparently failed to make a policy stand, meanwhile the destruction continues. We would ask ….

How long will it be before someone writes of "the Invasion of Niokolo Koba"?

[10] "*Soleil*", June 17th, 2000.
[11] Agence France Press, June 16th, 2000.

their nature, the Guinean and Soudano-Guinean forests of the Casamance and Kedougou possess a rich and important biodiversity. However, with the rapid destruction of these forests, the natural biodiversity is being devastated.

Lessons Learned

10. The area encompassing the Casamance and Kedougou are conflict zones. Without speaking directly of the Casamance Separatist Movement, it is evident that the zone is ripe for conflict: in the Forest of Pata, for the exploitation of charcoal, and for the natural resources of Kedougou and of Nikolo Koba.

11. The agricultural importance of the Casamance must not be overlooked. Its importance as a rice-growing zone as well as for other staple and cash crops is evident. However, rice cultivation needs considerable techncial support, e.g., for antisalt intrusion or antierosion devices as well as for improved production systems.

3.2.4 The Transitional Zone (Sudan-Sahel Savanna)

This zone, which effectively occupies the entire department of Tambacounda, is a heavily degraded witness to the former Sudan savanna that once dominated. The zone presents two mobile fronts, the northern boundary that is moving south and the southern boundary moving into Kolda and Kedougou. Both boundary shifts are being caused by a confluence of factors, the most important being:

- *Unmanaged deforestation for charcoal and timber exploitation*. These operations have removed most of the noble species, leaving behind economically unimportant species (as far as timber is concerned) such as *Sterculia setigera* and *Bombax costatum*

- *Indiscriminate bush fires killing fire-tender species and preventing regeneration of fire-resistant ones*. Many reasons have been given to explain the frequency of fires in the zone. Among these are: collectors of *Sterculia* gum who light fires around their trees to keep herders away and in the belief that it causes the sap to rise more profusely; herders who burn dry *Andropogon* grasses to encourage this perennial species to grow green shoots in the dry season; accidental fires caused by cigarettes; deliberate fires set as wanton acts; fires set by the Forestry Service during controlled burning (so called "*Feux Précoces*") campaigns that get out of hand; etc.

- *Overgrazing, especially in years when the grass production of the Ferlo is inadequate,* causing herds to move earlier into the zone than is normal in search of pastures. The overgrazing effect is compounded by the loss of pastures due to bushfires

- *Declining rainfall that is hindering regeneration of more noble tree species* while encouraging the growth of more aridity-tolerant species such as *Boschia senegalensis* and *Guiera senegalensis*. It is difficult to sort out the cause and effect of declining rainfall. Is the rainfall declining because forests are being destroyed, or are the forests being lost due in part to declining rainfall?

Several large-scale interventions have and are taking place in the zone. One is the forestry program of PARCE, since replaced by PROGEDE (which has a Tambacounda office). The latter

is seeking to encourage community forestry as a means of ensuring the continual and sustainable management of some remaining local forests. Many problems are being encountered with unabated forest exploitation committed by non-residents. We heard that the Forestry Service too frequently turns a blind eye to these practices, which have a negative effect on the local communities' management activities.

Given the rapid destruction and degradation of the natural forests of the zone, the biodiversity — both faunal and floral — is declining rapidly.

Lessons Learned

12. Much of the forested environment has been destroyed in the past 10 years due to overexploitation for charcoal. The forest resources remaining must be carefully managed to prevent their total disappearance and the disastrous consequences this would have on local populations.

13. Improved agricultural methods are required in the zone to permit agricultural intensification to increase and help reduce the pressures on the remaining forested areas.

3.2.5 Senegal River Valley

The floodplain of the Senegal River forms an arch around much of the eastern and the entire northern boundary of the country. The zone has historically contained extensive forests of *Acacia nilotica* (Gonakié) that survived side by side with pastoral activities (frequently practiced by herdsmen from Mauritania) and recession agriculture. Unfortunately, the majority of Gonakié forests have been lost to charcoal exploitation, many in the recent past. The pastoral and agricultural profiles have also changed dramatically in the last 20 years due to the construction of Manantali Dam on the Bafing River in Mali and the Diama salt-intrusion barrage between Senegal and Mauritania near the mouth of the Senegal River. The dams were constructed in the 1980s to expand irrigated farming along the river and in the delta, to generate electricity for urban and industrial development, and to make the river more navigable[12]. The three associated governments created the OMVS to oversee river basin development, management, and planning. The effect of the dams has been to commercialize agriculture on a large scale, often to the detriment of the traditional occupations but to the benefit of the economy as a whole. Traditional pastoralists have been forced from the zone, and only slowly are livestock reintegrating to the agricultural system. Paradoxically, lack of access to water is the main constraint to an increase in livestock utilization of the river valley. In addition, recession agriculture can no longer occur to any great extent since the Manantali Dam regulates the flow and therefore flooding of the river.

On the Senegalese side of the river, agricultural development has been driven by SAED and by private and state enterprises. Mistakes have been made — for example, insufficient consideration of the marketing of products — but much progress can also be seen. Large areas of high agricultural potential remain to be brought under more intensive cultivation; this is likely to be a major development aim in the next 10 years.

Much of the interesting biodiversity of the River Valley has been destroyed during the last 50 years with the cutting of the riverine forests and the introduction of intensive agricultural practices. However, the River Valley can still lay claim to probably the most important bird

[12] USAID (2000): The Future of the Senegal River Basin: Making the Right Decisions Now.

reserve in West Africa, located at the Djoudj National Park, near Saint-Louis. The special importance of this park is as a "stopping-off" point for spring migrants from the African continent toward Europe.

Lessons Learned

14. The two principal dams on the River Senegal have dramatically altered the agricultural and environmental regimes of the Senegal River Basin.

15. The importance of linking improved marketing of products with the introduction of systems that seek to increase production should never be overlooked.

3.2.6 The Niayes Zone

The Niayes, or "Grand Côte," are composed of a strip of land, predominantly dunes and inter-dunes, that runs along the Atlantic coast approximately between Dakar in the south and Saint-Louis in the north. They illustrate an encouraging example of how NRM techniques can be allied with intensive agriculture practices to the benefit of the local population and the economy.

This zone has traditionally been menaced by mobile sand dunes moving inland from the coast and threatening the dunal depressions, which are important areas of intensive horticulture, further east. The GOS, with donor support, made a concerted effort that led to a massive dune stabilization program, which has stabilized the dunes and safeguarded the horticultural basins, using grasses, trees and, rock. For example, the natural reserve along the coast of Popenguine has been maintained with indigenous and exotic tree species. This reserve is also an ecosphere for flora and fauna that have been threatened by decreased population as a result of degradation and commercial development along the coast. Much of the land area, or Niayes[13], has characteristic soils that can be highly productive if correct management techniques are employed.

Lessons Learned

16. The Niayes provide a sound example of how the adoption of NRM practices can improve agricultural production.

17. The dune stabilization program has effectively safeguarded the fertile and productive Niayes soil.

3.2.7 Estuaries and Mangrove

This is one of the smaller eco-zones, but arguably one of the most economically significant and threatened. Mangroves are a forest type composed of few species that create effective barriers between the land and the sea and allow the development of impressive deltas composed of sand and mud flats colonized by mangroves and dissected by brackish, tidal channels or *bolongs*. Not only do mangroves provide a physical barrier between the sea and the land, they are also important nursery grounds for a host of larval and plankton forms of aquatic life, among which can be counted the most important species of commercial fish, crustacean and mollusks. Mangroves also provide exceptional building timber since the wood is resistant to termite attacks and decays slowly.

[13] The "Niayes" refer to water-collecting depressions that naturally form between dunes and serve for local cultivation

The mangrove community is highly sensitive to changes in the salt content of water. The decline in rainfall over most of Senegal has meant less freshwater coming off the land and the increased incursion of highly saline water into the mangroves. This has caused the death of large tracts of mangroves, particularly visible on the road between The Gambia and Ziguinchor. Overexploitation for timber and fuel-wood has also devastated great areas of mangrove, exposing neighboring land to seawater incursion, with extremely negative impacts on rice cultivation (see subsection 3.2.3) and reducing fish reproduction.

Wildlife organizations have recognized the value of mangroves and coastal wetlands, particularly in terms of the biodiversity of bird life and aquatic life. For this reason, the National Park of the Sine-Saloum was created and structures such as IUCN are heavily involved in ensuring its conservation. Manatees and dolphins are important mammals occasionally seen in the Delta.

Rice cultivation activities are often associated with the landward fringes of mangrove swamps. However, many paddies are suffering from the decline or total destruction of the forests by salt-intrusion either via the water table or due to saltwater incursion. Enormous tracts of land are affected; their rehabilitation must be considered an Ag/NRM priority in the near term. Several promising rehabilitation techniques have been tried in the recent past. Among these is CBNRM at Pakane, where the water table has been lowered significantly by planting Eucalyptus. Also noteworthy is the experimentation of ISRA, AFRICARE, and the Israeli Cooperation near Kaolack, where anti-salt intrusion dykes have been combined with water-retention *diguettes* and salt-tolerant trees. Both methods are showing encouraging early results, with significant grass production occurring on previously sterile *taans* and the promise of significant future income from the timber trees planted.

This brief review of the zones of Senegal has highlighted the intense and increasing pressures being applied to the natural resource base, causing their decline and increased competition between sectors of society for remaining resources. Analysis of the effects of this competition is vital to developing appropriate strategies for protecting the future of Senegalese resources.

Lessons Learned

18. Estuaries and mangroves are important biodiversity sites.

19. They should be recognized for their great importance to the economy, especially for sectors such as fisheries and rice cultivation, and that this status compels their protection as a national priority.

3.3 Competition for Limited Resources

A tenet of ecological theory is that when the size of a population increases, so does the level of competition between members of that population. This competition exerts a corresponding pressure on the natural resources employed by the population, and so the natural resources decline, then accentuating the competition. The result of such competition, the theory says, is that one section of the population will be obliged to change tactics — look for a different resource to exploit or migrate, for example — or become extinct. This change in tactic can be seen at work throughout Senegal, particularly in two major food growing zones of the country: the Sine-Saloum, and the Peanut Basin. The responses witnessed include increased urbanization (the rural exodus), development of local artisan or business skills, and migration to new zones.

In particular, it is the latter response that interests us since in many cases, it simply removes the intensity of competition for limited resources from one zone and transplants it elsewhere. One case stands out in the Senegalese context: the invasion of the Ferlo by agriculturally oriented and sedentary immigrants, as described in the box below.

Invasion of the Ferlo

The Resident Population

The Ferlo, the main pastoral zone of Senegal, is traditionally inhabited by a mostly transhumant population, the majority of whom are Peulhs, whose livelihood involves the extensive grazing of livestock herds. Some sedentarization has occurred around permanent water sources, mostly established boreholes, but the transhumant lifestyle still predominates. The Ferlo is divided between two great geological features: the sandy Ferlo (predominantly to the west) and the cuirassic Ferlo (to the east). The two regions have distinct vegetation and grazing qualities with very different potentials for livestock rearing. Herders prefer to use the pastures of the sandy Ferlo.

Despite the extensive nature of the grazing available in the Ferlo, the relatively sparse, sporadic, and inconsistent rainfall results in highly variable rangeland production both between zones and from year to year. Further, considerable areas of the Ferlo are only partially available to herds during the dry season due to a lack of water. As a rule of thumb, during the dry season, herds must remain within a radius of 30 km from a water source (basically working boreholes). Herders are relatively restricted in the zones that can be exploited during the dry season. This had led to considerable competition between herds for grazing land and overgrazing has become a feature of much of the Ferlo, especially inside the 30-km radius of boreholes. For herders of the Ferlo to maintain their current lifestyle, they require the extensive grazing lands that have been traditionally available to them.

The Immigrant Population

Increasing populations in the Sine-Saloum and the Peanut Basin experience the dual problem of declining crop productivity and the reduction of land available for cultivation. During the past 30 years, these effects have caused considerable migration of peasant farmers from their traditional areas to so-called “new-lands.” Initially, movement was toward Tambacounda, then toward Kolda and the upper Casamance and even into the extreme southeast (Kedougou) of the country. But during the last 10 years, there has been considerable migration of sedentary agriculturists into the sandy Ferlo, a migration assisted and promoted by religious movements.

This has brought traditional migrant herdsmen into direct conflict with the newcomers. The herdsmen claim that their traditional pastures are being taken from them and their traditional migration routes blocked, while farmers claim that grazing cattle are damaging their crops. This inflammatory situation awaits a resolution.

Competition for other limited resources also threatens to escalate conflict. One especially volatile situation involves the unsustainable exploitation of forests for charcoal production. Government also talks of ceding the management of natural resources to local communities, which then are obliged to look on as their resources are taken and forests cut, usually by outside entities. Recent history shows the movement of charcoal-makers, seeking to satisfy the demands of Dakar, spreading from the forests of Thiès and Bandia, to Koumpentoum to Tambacounda and south to Kolda and Kedougou. Where to go when the last expanses of forests are finally exhausted remains a pressing question for the future of Senegal’s energy needs.

Lessons Learned

20. Competition for limited resources can only intensify in Senegal as populations increase and the natural resource base is diminished. Further and more virulent social conflicts are certain unless political and social solutions can be implemented.

Chapter 4: Lessons for Future Consideration

Chapters 2 and 3 reviewed the information gleaned from studies and data-gathering exercises carried out by the team. Based on that information, this chapter develops the lessons that can emerge from our investigations. Overall, we believe the Government of Senegal and donors have achieved some exceptional progress during their extended period of cooperation. At the same time, much disservice — some deliberate, inadvertent, and foolish — has been engendered in the name of assistance to development. As we expose assorted good and bad experiences, we firmly believe that no lesson that is well learned should be considered bad, provided such lessons guide the development and execution of future interventions.

This chapter looks carefully and without apology at both good and bad outcomes. On the one hand, it critically underlines failures in activities and within the development system itself, while spotlighting successful interventions that deserve to be replicated, on the other. For convenience and as a framework for the second document in the series, we have categorized the lessons learned under the following major headings:

- Political framework
- Scale of intervention and target populations
- Natural resource management approaches
- Criteria for selection of project/program activities
- Information management and availability
- Training, animation, and extension
- Methods of financing

Occasionally there will be overlap between comments and lessons learned within different categories. This is natural given the artificial divisions we have selected for this analysis.

4.1 Political Framework

The natural resources management and development sector in Senegal has traditionally suffered from a lack of direction, leadership, planning, coordination, and cooperation that has curtailed the effectiveness of development programs and created confusion within both government and the beneficiary communities. In examining this statement, we will look at the role of government, the existence and place of sectoral plans and programs in NRM, and the extent of donor coordination within the Ag/NRM sector. We are aware that this discussion could prove controversial, especially coming at the start of this concluding chapter. However, we believe it would be professionally dishonest and render a disservice to Senegal to ignore the anomalies in the general assistance program within the natural resources sector.

4.1.1 Role of Government

Donors operate within and for the benefit of sovereign states and thereby have a role in cooperation and assistance that is subordinate to that of the national government. In Senegal, the financial coordination of development activities of all kinds lies with the Ministry of Economy,

Finance and Plan, while technical coordination lies with the relevant Ministry of *"Tutelle."* Recent history has seen frequent changes in the numbers, identities, and make-up of ministries intervening in the natural resources and environment sector. In the new and current government, the ministries of hydraulics, the environment, agriculture and livestock, and regional planning all claim a considerable role and influence over Senegal's natural resources.

Despite the number of ministries intervening in the sector; the complexity of their structures; and the plethora of donors, decentralized groupings, NGOs, CBOs, projects, and others, no single functional senior coordinating body exists within the government with responsibility for Ag/NRM technical matters in Senegal. There is an inter-ministerial committee, but this unit is predominantly concerned with the general affairs of state. Another body, the *"Conseil National de Développement Rural"* (National Council for Rural Development), apparently meets twice a year, but does not appear to play a strong or effective coordinating role.

Unless Senegal establishes a senior coordinating body for the Ag/NRM sector, the country's natural resources will continue to decline alarmingly. Such a body should draw its members from high-level echelons of relevant ministries, probably at least at a senior technical adviser level. Without such a controlling structure, interventions in the Ag/NRM sector will continue to be made in piecemeal fashion.

One structure, CONSERE (*Conseil Supérieur des Ressources Naturelles et de l'Environnement*) could be charged with some environmental coordination, although its brief does not cover agriculture, a significant omission. Established in 1993 by the then-Minister of the Environment and Nature Protection (MEPN), CONSERE enjoyed considerable political patronage as well as significant financial support from the donor community and particularly USAID. CONSERE's mandate broadly is to ensure the synergy and coherence between sectoral policies involving the environment, and the management of natural resources in Senegal. However, since coordinating development of the National Environmental Action Plan (PNAE) and the National Action Plan for the Fight against Desertification (PAN/LCD), CONSERE has gone into decline and lost influence. This decline has been compounded since Minister Bathily was removed from office in 1998 and USAID withdrew financial support. We believe the role of CONSERE needs to be reviewed and, if found to be inappropriate, its structure should be reshaped or the unit disbanded entirely.

Lessons Learned

21. Without a strong lead from a permanent senior government structure charged specifically with coordinating all technical interventions in the natural resources sector, GOS and donor interventions alike will struggle to come to terms with the rapid decline of Senegal's remaining natural resources.

22. This structure needs to be financed within Senegal's national budget and not from external sources. Parastatal structures, built for the large part on donor finance rather than being incorporated within the state budget, have a significantly smaller chance of sustainability when donor funds are subsequently withdrawn. However, cases such as the Centre de Suivi Ecologique (Case Study 2) illustrate that sustainability is possible if a sufficiently long transition period is built into the assistance budget and if the structure has the means of auto-financing its operations.

4.1.2 Sector Analysis and the Development of a Sectoral Program

Not only does Senegal lack a politically powerful coordinating body for the natural resources sector, it also has not undertaken a definitive natural resources sectoral analysis or a program for coordinating interventions within the sector. There is body of opinion that the aforementioned PNAE and PAN/LCD provide good analysis and could also provide the framework for coordinating interventions. However, these are action plans rather than strategic plans for developing the sector and both lack a specific statement of Senegal's priorities for NR sector development and estimates of budgetary requirements. In the absence of such sectoral guidelines, coordination of interventions will remain practicably impossible. The NR sector could look for valuable guidance from recent developments in the health and education sectors.

Another stumbling block is that government and donors have not built a common or even complementary Ag/NRM program based on recognized priorities and to which GOS agencies and all donors could subscribe. The absence of a coherent environmental program going forward is a significant oversight by the two parties. It results from the lack of a GOS coordinating structure and a dearth of cooperation and trust between certain donors.

The example set by partners in Madagascar might be instructive for donors and the Senegalese authorities. Together, they developed the NEAP, prioritized requirements, and determined the level of finance needed for each component. Depending on the agreed levels of priority, different aspects of the NEAP are being enacted in a series of five-year Environmental Programs to which the major donors have subscribed and contribute. Clearly, donors working as partners and all pulling in the same direction is an underpinning of successful coordination.

Lessons Learned

23. The Ag/NRM sector in Senegal requires a definitive development program that defines sector priorities, costs out the financial implications, and calls on government ministries and donors alike to buy into the program. If the program is well developed there would be little need for donors to carry out much "independent" intervention in the Ag/NRM sector.

24. Such a program does exist for the forestry sector following an agreement of cooperation between the Direction des Eaux et Forêts, the Netherlands Cooperation, and the FAO. Although other donors have been invited to subscribe to the program, it still only covers a subsection of the NR sector and is therefore insufficient on its own.

4.1.3 Government Technical Services

Radical changes have taken place in the state's approaches to technical services due to budgetary cutbacks and the apparent preference of donors to work with local NGOs rather than with state services. The budget reductions and the changes in donor approach have been compounded by the requirements of structural readjustment programs, which have led to a considerable decrease in government recruitment and a reappraisal of the state's technical role.

Agriculture and livestock agents have long held advisory roles within rural communities. However, in the forestry sector, agents have also played the role of forestry law-enforcement agency, a role that has outlived its usefulness. Indeed, agents' true value now lies in their taking a conciliatory, advisory, and participative approach to solving problems, not in preventing access to natural resources that are crucial to the local economy and well-being. Agents are charged

with helping rural populations safeguard their resources, and attain and maintain a sustainable level of exploitation and renewal. If forest agents are to retain a police role, it should be to prevent outsiders from indiscriminately exploiting local community resources. Uncontrolled forest destruction, mostly for charcoal production and agricultural exploitation, is particularly acute in Senegal.

Progress still needs to be made both in opening up rights of access and sustainable use of local natural resources, and in reducing heavy-handed policing of forestry agents. Conversations with villagers around the Forest of Bandia suggest the continuing presence of a protectionist policy by local agents of the Direction of *Eaux et Forêts.* This area, having experienced 40 years of reforestation activity, still remains off limits to local villagers unless they receive express approval from the local forestry agent. Such heavy-handedness will never induce a responsible management approach from the local population nor engender cooperation and respect for the forestry service. Senegal's foresters could learn from their counterparts in other Sahelian countries, especially Niger. There, foresters have learned that they are more effective as partners than police, and have undergone a dramatic transformation in approach. In the process, they have become more respected and valuable to the rural population.

Lessons Learned

25. Government technical agencies have far more success influencing the actions of local populations when they act in an advisory and technical role rather than in a police role[1]. Members of rural communities frequently view forestry agents with distrust – a detrimental sentiment if responsible community involvement in Ag/NRM is to be achieved.

4.1.4 Donor Coordination

Just as there is no official government coordinating structure for Ag/NRM affairs, there is also no official interdonor coordination (although whether this latter structure is really desirable exclusive of GOS participation is open to debate). Some members of the donor community have stated that an informal donor coordination structure does exist; in fact, although it meets regularly, it serves more as a forum to exchange information than a body that actually coordinates donor efforts in distinct sectors or locations.

We believe that the presence of a donor-coordination structure that is not headed by the government seriously debases the integrity of the host nation. Considerable support for this point of view has been forthcoming from stakeholders both within and outside of government circles. It is politically correct for

Coordination

The most serious institutional problem encountered during this mission is the absence or ineffectiveness of coordination among those who intervene in Ag/NRM. At every level and between every level, actions taken by one party fail to indicate that there is understanding of what others are doing. This transcends all layers of the institutional environment: donors do not know what other donors are doing; projects are uninformed about what other projects are doing or how they are doing it; government departments are unaware of interventions undertaken by other departments.

The words participation, collaboration, cooperation, and partnership are widely used at every level. However, beyond the spoken word, there is little evidence that effective coordination, or even communication, occurs between any two actors at any level. The net effect of this absence of coordination – or as it is more optimistically expressed, "information sharing" – is that approaches are pursued with financial and technical support from one donor group while another operating in an adjacent area may offer technical solutions that conflict with or render difficult the effective conduct of activities for the other group.

[1] McCormac-Wild, C. & Wild, P. (1996)

GOS to retain overall control of such a coordinating structure. GOS control would also serve to direct donors to priority intervention areas and activities, and would limit the turf battles between donors.

Lessons Learned

26. GOS-donor coordination and agreement of complementary actions within priority development areas would enable a more holistic and successful approach to development in the Ag/NRM sector.

27. Partners in the Ag/NRM sector in Senegal might find it useful to look at the program approach put in place in Madagascar following the development of that country's NEAP. Together, GOM and donors have established and bought into a series of Environmental Plans that involve GOM and donors working in independent but complementary environmental sectors. The approach was assisted by the work of the Multi-Donor Secretariat.

28. A considerable body of consensus exists in Senegal that the current state of Senegal's natural resources bears testimony to the absence of a formal, strong, and effective government-led coordination body.

4.2 Scale of Intervention and Target Populations

Certain activities dictate the scale at which projects and programs should work. For example, the sustainable management of a village wood lot would logically involve the village association or committee. Or, assistance in the planning of a vegetable garden might concern one or more individuals or a household or a woman's group.

However, too frequently it is reported that activities underachieve their objectives because assistance activities have failed to take correct account of the scale of intervention that is necessary. For example, the CBNRM project has admitted that it was not totally successful in early anti-erosion measures because it failed to take account of the extent of the problems and did not involve all neighboring communities in counter measures.

Most recently, the "watershed" or "supra-village" approaches are getting passed over in favor of the village or community approach. However, there is room for both, as defined by the scale of intervention required.

The right scale of intervention should be used to match the scale of the problem. For the Dune Fixation Program, for example, an interregional scale was necessary because the scale of the problem was so large. For the reclamation of rice paddies suffering salt intrusion, the involvement of several communities would likely be required, while for small business development, the individual might well be the best scale to adopt.

The processes of decentralization and the empowerment of the rural community level offer significant Ag/NRM opportunities. The CBNRM project is beginning to have some successes at this level.

In the following section we review the lessons learned from adopting differing scale of interventions and consider the optimal target population with which to work..

Lessons Learned

29. No single scale can fit all conditions. Ag/NRM interventions must adopt the scale of activities suitable to the prevailing conditions and the problems to be resolved.

4.2.1 The Individual Versus the Community

Recent patterns in community development have tended to emphasize the community and association rather than the individuals within the community. One school of thought suggests that this is a logical approach, and relies on the following kind of arguments:

- Working with communities and associations can affect more people than concentrating on individuals (thus an economy of scale)
- Risk and reward is spread more equitably
- Natural resources tend to be in the possession of communities and associations
- Selection of one individual over others can lead to problems of envy or jealousy, or other sources of conflict

Incentives

Inconsistent treatment of people seems to be a characteristic of many donor programs. For example, within the USAID mission, personnel receive merit certificates for participating in training or for doing well at assigned tasks. In the field, however, it is rare to find those incentive practices being applied.

Farmers receive training, acquire skills, achieve thresholds and, in addition to the learning that they take with them, may receive a handshake, and in many cases, per diem payments. Intellectual fulfillment may often be enough; however, a certificate or other special recognition can provide an extra spark of satisfaction to encourage someone to further excel at their work.

People in rural areas, it may be argued, already receive enough incentives simply from having intensive development assistance directed their way. Still, extra motivation at a personal and more human level can be provided at little or no cost. Too often in the implementation of programs, this tends to be ignored.

However, just as working with entire groups or communities can minimize potential problems, it also may diminish the achievement of individual success. Key arguments behind this logic are:

- Entrepreneurial talent tends to be an individual gift rather than a collective one.
- Within any target group there will be some individuals who are more productive than the others.
- All members of the same group are usually rewarded equally despite the different levels of effort. This would tend to discourage individual achievements.
- Decisions on the utilization of any profit will not always favor the most efficient choice. However, all members are obliged to accept the majority or controlling decision.
- Success brings considerable imitation.

We suggest that in the majority of entrepreneurial cases, the individual would be a more logical target than the community, while in the management of a community resource, the community group or association should be favored. However, we would nuance these last remarks. Where for example, individual literacy or development of business acumen is the target, it is logical to

carry out the training programs at the group or community level and therefore cover more people. In contrast, where a production practice is being developed, the community resources would probably be better subdivided between the individual members and each member allowed to develop their parcels as they choose. For example, when a woman's group sets up a vegetable garden, each woman should receive an equal allocation of ground and have the liberty to work her land as much or as little as possible and reap her own rewards.

The inevitable result will be that one or more women will work harder, be more innovative, diversify more, and produce higher revenues. Not only should such achievements be recognized, they should also be encouraged and if possible held up as an example to others, both inside and outside the community. Auto-adoption of techniques is directly related to the wish to achieve or surpass the achievements of others. Similarly, in livestock fattening exercises, some system for recognition of the most efficient methods could be developed (e.g., perhaps a Senegalese equivalent to the blue ribbon).

Lessons Learned

30. Where entrepreneurial activities are being promoted, it is more logical to favor the individual rather than groups; while in most cases where a community resource is to be managed, it should be the community group or association that is favored.

31. Individual achievements should be recognized and encouraged by holding them up as examples, both inside and outside the community.

32. Auto-adoption will be assured if new/different techniques are seen to be more productive than traditional methods.

4.2.2 Women Versus Men

This is a sensitive and complex subject. Donor interventions have often made grave errors by adopting a policy of favoring one gender while excluding the other. One notorious example occurred in The Gambia, where a donor sought to improve paddy rice production and the first step in the process was that land tenure should be awarded to the men of the communities involved. The major oversight was that women do most of the work in the rice fields. As a result, women felt their interests were not being respected.

Closer to home, during the KAED project (see case Study 1), AFRICARE admitted to favoring women, almost to the exclusion of men, in the development of agriculture-based enterprises. The oversight was that men were relied on for carrying out some of the most important natural resource management techniques (e.g., planting of live hedges, construction of *diguettes*, etc.). Quite understandably, the men, having been excluded by the project, were not always prepared to be cooperative.

Projects frequently tend to overlook the importance of traditional social norms during project development. Empowering women and helping them to become financially independent of their menfolk might strike a liberation cord in western eyes, but in fact, it runs counter to many sectors of traditional Senegalese society and probably does considerable damage to the cohesion of such societies. It is far better to work with households and develop in a clear and acceptable fashion the individual roles of the different members. Where it is decided that an activity wishes to work

in preference with one gender, it would be preferable to explain carefully to the other gender why such an arrangement is being made and what are the advantages that *both* groups can draw from the arrangement. While there is little doubt that women should be more greatly empowered and their contribution to society better recognized, the process of doing this should be handled with sensitivity.

Lessons Learned

33. Western prejudices should play no part in the development of local interventions. Particular care must be taken to ensure that the fabric of traditional society is not damaged by western ideals.

34. Rather than the women-versus-men debate, we should look more closely at the household unit in the development of local interventions and play to the traditional strengths of that unit, while taking into account the various interest groups (women, youth, etc.).

4.2.3 Youth and Youth Groups

"Youth are the future of society" is an undoubted truism. However, our observations in Senegal tell us that all is not well with the younger members of society who represent a very significant and growing percentage of the population. Village-level conversations revealed that youngsters increasingly see no future in a traditional peasant farming existence, and the majority aim first to escape from the village toward the cities, and then to escape the cities for opportunities offered by foreign countries (notably the United States and Italy). This trend means the rural population is growing older while that of the cities is growing younger. DeCosse (1998), in an analytical paper to USAID, succinctly developed the subject and opportunities of job diversification as a rural strategy against recurring periods of low crop production. Our own observations support this and have shown that principally elderly people and young children populate more and more villages. Further, we found it is often the household head himself who decides to send young men and women away from the natal village in search of work. This trend has serious consequences for the future of rural life should it continue unabated.

Currently, limited efforts are being made to show the younger generation that the rural situation offers future possibilities. Although these efforts are not enough to make a significant impact on the rural exodus, they demonstrate that certain organizations are taking the situation seriously and seeking to counter it. The Swiss Cooperation is undertaking some interesting initiatives, the government is developing a new policy seeking to address the problem, and certain private and public teaching institutions are becoming involved. Youth will go back to the land if Ag/NRM can be shown to offer sufficient rewards.

Lessons Learned

35. Youth are becoming disenchanted with traditional rural life and are seeking outside opportunities, frequently without success.

36. Some activities are seeking to counter the exodus of youth from villages by demonstrating that there are opportunities to be taken in the rural situation, e.g. the training programs of the experimental farm of Keur Momar Sarr and the Swiss Cooperation.

4.3 Natural Resource Management Approaches

Perhaps no other aspect of development work has witnessed as great an evolution over time as the choice of the management approach used to bring populations into the development processes. Methods have varied over time and from place to place. The most important stages of development agent/stakeholder relations are as follows:

- Forced or paid labor, where the state has been the controlling agency and the population has been given no future stake in the process
- Participatory approaches, where the population provides a level of feedback before activities commence
- Community approaches, where local populations are brought in as partners to the development processes
- Community management, where responsibility for the future management of resources lies with the local communities, and an offshoot of this approach, co-management, where there is a direct and complementary relationship between the state and local populations

4.3.1 Forced/Paid labor

Forced labor was a feature of the pre-independence period in which rural populations were frequently pressed into working for the state authorities, often on large-scale programs that moved from community to community. Fortunately, this approach has not occurred in recent times, having been replaced, at least initially, by work rewarded either by direct monetary payments or paid in food items. For example, both approaches were used during the immediate post-independence tree-planting campaigns in Casamance and at Bandia. The most extensive program of this kind was the "Fixation des Dunes" program.

To a lesser extent other projects have sought to "buy" the cooperation of rural populations by providing monetary rewards for natural resources efforts. The key example from among recent USAID interventions was the Senegal Reforestation Project (SRP), where villagers were paid for planting trees and ensuring their survival for pre-agreed periods of time. The intent of the direct payment scheme is to encourage (using monetary incentives) members of rural communities to undertake Ag/NRM-related activities.

Full monetary or in-kind payments can only be warranted if the activities being undertaken will produce no direct or short-term reward for the participating members of the population or perhaps in an experimental situation where the outcome is uncertain[2]. This was indeed the case

[2] For example, as developed in the Guesselbodi natural forest site in Niger, where labor was initially paid to carry out development work simply because no one was sure whether local people would eventually get management rights to the land or even if managing local forests would be able to provide sufficient financial rewards.

for the dune fixation program that began in 1970s and finished in the early 1990s, with assistance from several donor organizations. The program objective was to develop a permanent barrier some 250-km long against sand dune intrusion along the coastal strip running from Dakar in the south to Saint-Louis in the north. This forested strip still stands today and has successfully protected valuable farmland lying to the east from the encroaching coastal sand dunes.

Furthermore, it has remained unexploited by the local population and validates the option of paying the local communities for their efforts. In contrast, it is harder to argue for the SRP approach since the project's aim, in many communities, was to help in the development of woodlots and field barriers, etc. The communities did gain considerable short- and medium-term benefits from their reforestation activities and therefore should not have received payment for their labors. To quote Mr. Dramane Ouattara, the former Resident Representative of UNDP/Dakar, "why should we pay people to build their own houses?" We share his sentiment and propose that a better approach toward long-term sustainability is to persuade the local population of the benefits to be gained from undertaking natural resource activities, not bribe them to do so. This may require developing demonstration sites, for example, (as convincingly developed by KAED) or adopting model farmers to serve as local role models for other members of the population. Direct payment to members of local populations for services that directly benefit them are today much rarer (but still practiced by CBNRM), having generally been replaced by participative and community involvement. Let us commit to relegating such actions to the past.

Lessons Learned

37. Payment to local communities/individuals for Ag/NRM work should only be made when the individuals concerned will not reap the direct benefit of the work during the short or medium term, or when experimentation is occurring. The Dune Fixation Program is a good example of how this principle should be used, while the Senegal Reforestation Project is a less successful example.

4.3.2 Participatory and Community Approaches

Several forms of participative or community approaches have been developed by organizations in different regions of Senegal and in other countries of the subregion. The participative approach arose both from a distrust of the payment-for-work philosophy described above, and from the growing understanding that rural populations could be better masters of their destiny and managers of their resources than had previously been thought.

Slowly, development organizations have come to realize that environmental protection measures that take no account of the rights and traditions of local populations are certain to fail, except in the presence of rigorous enforcement measures (with all the negative social and environmental implications attached). The participative approach seeks to encourage direct integration of community rights, traditions, and participation with the objectives of sustainable natural resource utilization and environmental protection. This has required the development of close relationships between communities and technical assistance structures (NGOs, projects, and government). Together, they seek to define sustainable exploitation regimes and the realization that resources are finite unless managed correctly.

An Alternative Approach to Participatory Rapid Rural Appraisal

The Participatory Rapid Rural Appraisal (MARP in French), which has captured so much attention in recent years, is not an appropriate community development technique, in the authors' view. In practice, it is not rapid, is less than participatory since it requires an outside team to intervene in a village for up to several weeks, and offers little advantage, if any, over information that could be attained in a less invasive manner. It is costly, both in manpower and financially, because it involves so many "appraisers" who come from outside the community. It is a time-consuming process that can seem condescending or deprecating to the villagers being interviewed. In requiring villagers to devote a substantial amount of time to the process, it engenders a carnival atmosphere, which may skew the responses of the people. Its insistence on having farmers use stones to show their relative year-to-year production results seems to disregard the fact that the great majority of "uneducated" (i.e., who lack formal education) farmers are able to report the exact amount they produced going back several years on a field-by-field basis.

By contrast, an effective community development-based appraisal could be made simply by observation while engaged in informal discussion with the respondents. While conversing with a respondent, the perceptive development agent could gauge the:

- Wealth of the household by observing such things as: the number, state of repair, and the materials used for the buildings; the condition of adults' and children's clothing and shoes; the presence of poultry and small ruminants (as a proxy for agricultural enterprise diversity); the presence or absence of nonindigenous products such as metal and plastic utensils, plastic or metal chairs, radios, lanterns, to name a few
- Health of the household by observing the general condition and fitness of adults and children or the richness and diversity of nutritional content at meal time and the number of people – adults and children – sharing the meal
- Other development indicators, such as the presence of notebooks and pens, blackboards and chalk, evidence of cottage enterprise, etc.

This simple appraisal method is accomplished ideally without paper and pen present. Rather, the agent focuses on observing while holding a conversation. After the agent leaves the household, using recall, observations are recorded. If necessary, multiple visits may need to be made to the same household. With practice, the agent can be trained to capture essential information in a single visit. This method requires the interviewer's presence in the village, and at least one visit to each household; however, ideally the person performing the appraisal is an agent who regularly will work in the village, not an outside specialist coming for a specific exercise. At regular intervals, the agent can repeat the exercise to get an idea as to whether improvement is perceptible at the household level.

Participatory approaches are only workable if individuals or communities are given definite, enforceable rights over the natural resources they manage. If not, the resources remain open to uncontrollable outside exploitation and destruction. This fate has befallen many parts of Senegal, for example, through uncontrolled charcoal production or by invasion of traditional pastoral lands by agriculture.

Lessons Learned

38. The participatory approach arose both from a distrust of the payment-for-work philosophy and from the growing realization that rural populations could be better managers of their resources than had previously been thought.

39. Environmental protection measures that take no account of the rights and traditions of local populations will almost certainly fail. The participatory approach encourages direct integration of community rights, traditions, and participation with the objectives of sustainable natural resource utilization and environmental protection.

40. Participatory and community approaches are only workable if individuals or communities are given definite rights over the natural resources they manage.

Community Development

The participatory approach is a reaffirmation and refinement of basic community development principles that have been practiced for many years. The concept that the community knows the best course of action is simple and logical. It gets complicated when community members either are unsure of how to proceed or uninformed about alternatives available to respond to a given problem. Technical assistance is ideally suited to fill this need by helping community members identify and implement appropriate responses. This means that the technical assistance must remain close to the community, and that advisors know the community and its problems well, are technically and culturally informed, and are able to advise community members as they become familiar with the process of selecting interventions.

Caution must be exercised to avoid "guiding" the community to ends that may be inconsistent with their desires. This tendency is subtle but the consequences can be insidious. If done incorrectly, the community advisor risks losing the support of the community, in which case the intervention will no longer be viewed as "our program;" rather, it becomes "the advisor's program." Also, effort must be made to ensure that the participation is committed and genuine. In the past, "participatory" was used to acknowledge the fact that activities were carried out with the "participation" (i.e., active labor) of the local community. That deformation of the model is inconsistent with the authors' intent.

To be an effective community development agent, observation and communication skills must be finely honed. These skills do improve and yield rich returns as an agent spends more time in the community and comes to better understand residents' circumstances and constraints. Methods used by cadres of Animation Rurale during the 1960s and 1970s effectively mobilized community interest and encouraged community awareness on important development issues.

To be truly participatory – and ultimately replicable – technical interventions should include as much local effort and materials as possible. Local effort means educating all members of the community, not simply "informing" the community while focusing training on a select group. Local materials should be used whenever appropriate to keep down costs and to maintain a familiar atmosphere for the community. Additionally, techniques selected for extension should take into account the range of local skills and try to utilize them to the extent possible.

4.3.3 Management of Natural resources

Various mechanisms have been enacted to improve the sustainable management of local resources. One approach has favored community management of communal lands and forests, whereby one or more village committee or association decides the level of exploitation and authorizes individuals or groups to utilize the resources. Alternatively, individuals may be given exploitation rights and then may decide unilaterally how or whether they will exercise those rights. Frequently, committees and individuals may be counseled by technical organizations, for example, in deciding what level of off-take is sustainable, when is the best time for harvesting, or which are the best markets for the products.

The guiding tenet of community or individual management regimes is that it is in the best interest of the community or individual to manage sustainably the allocated resources (see the preceding Lessons Learned box above). The approach has been enacted in several areas of Senegal and should become more common as decentralization and local decisionmaking take hold. As noted earlier, community rights will need considerable safeguards if outside exploiters are to be controlled.

A third approach to local resource management is co-management, whereby communities work hand in hand with state technical services. In this arrangement, communities retain certain exploitation rights while the state technical services will generally control management and exploitation issues. Such an approach has been elsewhere with some success. For example, the MIRAY project, working with the local *Eaux et Forêts* in Madagascar, is testing the

development of community and co-management of eucalyptus forests in the south of the island. Early signs are favorable. There are also claims of success from Niger, Burkina Faso, and Benin.

Senegal has not had great success with co-management, with the exception of buffer zone management around the national parks of Nikolo Koba and Djoudj, and the activities of PROGEDE in Tambacounda and Kolda. We believe Senegal will not become ready for widespread co-management until 1) the national forest service sheds its reputation as an enforcement agency and is viewed with respect and confidence by the local populations; and 2) legal controls are enforced on outside exploitation of co-managed resources. Currently, PROGEDE is having problems with outsiders exploiting community forests under the guise of permits provided by senior government and CR officials.

Areas that stand out as providing great opportunity for testing co-management are the coastal dune plantations. Many of these sites have attained harvest size and require sound management if they are not to senesce. Local communities, with professional guidance, could start to make money from sustainable harvesting, with a portion of the revenue used for improving forest and dune management.

Lessons Learned

41. Community or individual management of local resources appears to offer a good way forward for the effective and sustainable exploitation of natural resources. However, this presupposes that the law is sufficiently robust to protect the rights of the individual or community.

42. Senegal is not yet ready for widespread co-management activities, at least as far as forest management is concerned. First, the national forest service must continue to improve its image and gain the confidence of local populations. The Forest of Bandia and the coastal dune forests would appear to offer favorable zones for co-management. However, the forestry department must improve its local reputation and prevent illicit exploitation before communities will be prepared to sign up to any co-management agreement.

4.4 Criteria for Selection of Project/Program Activities

Key criteria include:

- Relevance to the targeted zone and its inhabitants
- Perceived positive and negative impacts
- Replicability
- Sustainability
- Adaptability
- Cost effectiveness

Project developers and senior personnel should obtain replies to a set of critical questions before considering the preparation and execution of any programmatic activities.

Projects must seek to avoid the “one-size-fits-all” philosophy, common within the development community. What works well in one country or region may not be suitable for others. For example, the KAED program attempted to introduce a standard set of Ag/NRM practices into all target communities irrespective of their agro-ecoclimatic zones. Clearly, promoting the use of

hydric anti-erosive interventions in communities that do not suffer water-driven erosion[3] is not logical, nor is the use of the same technical packages for different types of agricultural and cropping practices. Activities must be carefully screened before adoption to avoid wasting time and resources promoting unsuitable or unnecessary practices. Generally, a well-informed population is likely to be able to enunciate what they require. The secret is to ensure that people are sufficiently well informed to develop sound opinions. This process can be aided by exposing community or individual representatives to similar situations where one approach or other has proven successful.

Development specialists too frequently look at the positive effects of a given intervention and ignore or forget about potentially negative ones. Even widely adopted and popular practices, such as many of the recognized Ag/NRM interventions, may have inherent disadvantages that are overlooked in favor of their more obvious advantages. Among the key Ag/NRM practices widely promoted across West Africa are composting, live hedging, windbreaks, and stone bunds. In fact, practice has one or more accompanying disadvantages that are frequently ignored in a project's efforts to achieve predefined objectives. For example:

- The composting of household waste can remove a valuable food source from household chickens, and requires considerable water and labor.

- The presence of live-hedging can negatively affect crops growing close to hedge boundaries, especially if the hedging species has been badly chosen, for example, by shading, competition for water, or by allelopathy.

- Windbreaks can grow too tall and require cutting. They can provide roosting sites for grain-eating birds or plant pests and can have negative effects on the underlying water table (e.g., *Eucalyptus*). Even *Leucena*, held up as an ideal and versatile windbreak species, has some drawbacks. For example, it has a high reproductive capacity, both by producing suckers and copious quantities of seeds, and has a tendency to invade the fields where it is supposed to be confined to the boundaries.

- Stone bunds, *diguettes*, and other Ag/NRM constructions can impose a heavy labor demand that may not be justified in terms of the positive impacts achieved.

The positive and negative aspects of each activity and intervention must be carefully weighed before beginning field implementation.

Development interventions, as their founding principle, aim to sustainably improve the livelihoods of target populations. Several issues typically arise around sustainability that should be carefully considered, including: 1) the initial costs of the interventions; 2) the requirements for continued funding; 3) the availability of technical assistance; 4) the level of difficulty in implementing and maintaining the activity; 5) the level of positive impact that the activity delivers; and 6) the adaptability of the technique should conditions change.

[3] Eriksen, J. & Miller, D. (1998): Kaolack Agricultural Enterprise Development Program Impact Evaluation. AFRICARE.

Failure to consider these factors will significantly reduce the chances of an intervention becoming sustainable.

Activities or techniques that can only work in the presence of a strict set of conditions are less likely to be adopted and sustainable than those that can be adapted in response to variations in prevailing conditions or can be transferred to areas where conditions may vary. For example, a very successful program sponsored by USAID used pedal-powered pumps to raise water from shallow water tables for use in irrigating market gardens. The success of the program could be measured in terms of the increase in land put under intensive cultivation, the increase in crop production, and the considerable demand for the pedal-pumps outside of the target areas. A comparable project in Chad introduced similar pumps to the *wadis* located near the northern boundary of Lake Chad for use in market garden activities. However, the farmers refused to use the pumps because they were not comfortable with the foot-pedal method for raising water. They had traditionally used the *shadoof* for irrigation, and this caused the development of strong arms and shoulders, not legs. If the program had thought to introduce hand-pedals, the system possibly would have met with greater success.

Resources destined for development activities are limited and are becoming harder to obtain. Therefore, it is important to ensure cost-effectiveness during the planning and implementation of activities. Further, if a given activity can be shown to be especially relevant and cost-effective, other donors or communities will be more likely to adopt the same strategy, thereby considerably leveraging the expenditure. This is an important element to ensuring replicability and sustainability.

Lessons Learned

43. During project design and implementation, the following factors relative to selected activities must be borne in mind: relevance; likely positive and negative impacts; replicability; sustainability; adaptability, and cost-effectiveness.

4.6 Information Management and Availability

A free and open exchange of information is seen as a cornerstone of the development process. For this reason, some donors have heavily promoted the establishment of mechanisms to encourage uninhibited data sharing. The World Bank stands out in this regard, with activities sponsored across the African continent and Madagascar. Significant but lesser contributions have been made by USAID (e.g., in The Gambia, in Niger with AGRHYMET, and the FEWS program across Africa); UNSO (e.g., in Senegal); the European Union (e.g., in Central Africa), and DFID (e.g., in Botswana).

Senegal is fortunate to have the foremost natural resources data collection unit in sub-Saharan Africa — the *Centre de Suivi Ecologique* (see Case Study 2) — the structure on which the Senegalese National Environmental Information System (EIS) is based. Information flow and availability has been promoted by the open house approach adopted by the CSE's general director. CSE is leading the national initiative to develop a directory of natural resources and environmental data for Senegal. Data are being drawn from all pertinent national agencies.

However, we believe the directory marks only the mid-point in the development of an efficient EIS. Three other components are required:

- All donors and NGOs contributing their own frequently large and significant data banks to the national EIS, with no conditions attached. Too much donor data is "ring-fenced" and not available to the user community.

- A critical screening of data to eliminate data of dubious quality. For example, doubts have historically been cast on the livestock data published by the *Direction de l'Elevage* in the years following the severe droughts. However, these data still retain a place in the directory.

- Senegal (perhaps CSE) should produce a definitive "State of the Environment Report" and update it annually. This report would detail all distinct interventions — GOS-led and donor-led — in a mapped format. These would be a key source of information for future planning processes.

A National Environmental Information System should tie into regional or continent-wide information systems so that relevant data can be shared. In this way, valuable experiences would be widely available and potential mistakes reduced[4].

Lessons Learned

44. Senegal already possesses an excellent basis for a national Environmental Information System and in this respect is ahead of many neighboring countries. The recent development of the directory of natural resource and environmental data is praiseworthy.

45. Donors must be encouraged to share their historic data with a wider audience. The practice of ring-fencing access (or cloissonnement) is counterproductive to the development process.

46. The EIS should be encouraged to rigorously screen all its data before circulating them to a wider audience.

47. Natural resource management would be enhanced by the production of a State of the Environment Report and a mapping of all Ag/NRM interventions.

4.7 Training, Animation, and Extension

A key element of development work is the transfer of competence and the multiplication of abilities among partner organizations and target populations. Most interventions, historical and present, have at least one component of capacity building. However, the way capacity building is actually carried out has evolved significantly. In this section we review different forms of training and capacity building and discuss the utility and long-term perspective of each type.

[4] USAID is developing the NRM-Tracker that seeks to bring together all USAID experiences in the Ag/NRM field into a single database placed on the Web. The NRM-Tracker will identify promising initiatives and summarize information about outcomes and enabling conditions (developed under the EPIQ/IQC).

Capacity-building exercises can be categorized from the most simple to the most complex in terms of the amount and quantity of information being transferred. These include:

- Animation
- Extension
- On-the-job and counterpart training
- Literacy
- Formal training

4.7.1 Animation

Animation has not always been seen as an important tool of capacity building and information transfer. In the 1960s and 1970s, many animators were trained and used extensively for conveying information and developing group abilities in often-remote rural communities. However, animation as a means of training went out of vogue partly due to suspicion among government agencies that animators were working against methods favored by state services. There is little doubt today that animators can play an important role in passing technical information using the relevant local languages. Additionally, rural communities tend to place greater confidence in an animator who is known and trusted than in an unfamiliar government agent or project technician.

4.7.2 Extension

Extension is a similar process to animation, but more technically biased and requiring greater one-on-one skills and technical ability. Different methods are employed to pass on the relevant message or technique. Too little use is made of demonstration plots (well used by KAED) and especially of model farmers. The excellent results achieved using common Ag/NRM practices by such dynamic individuals as Khassim N'Dour and N'Déné Diouf should be held up as valuable examples to other farmers in the same area. A digital catalog of such expertise would greatly enhance the development of "local experience" training in Senegal. It is perhaps the most under-utilized form of training at present.

The selection and targeting of one or more model farmers per zone for additional project assistance would have a great impact on the level of adoption of particularly successful techniques. The provision of an allowance to stimulate their role as model farmers should not be viewed negatively.

In the Peanut Basin during the 1960s and 1970s, SODEVA extension agents were based in villages and provided excellent technical information to interested farmers in their respective zones. These agents were well trained, both technically and from an extension standpoint. They were very effective at transmitting information to the farmer with whom they worked. To facilitate their work, each agent had a moped and an operating budget. The relatively quick and effective adoption of animal traction in the Peanut Basin was assisted by the work of these agents.

4.7.3 On-the-Job and Counterpart Training

This form of training relies on a close, one-on-one relationship of an "expert" with a more junior or less experienced individual. Such relationships can yield considerable success and can greatly improve the sustainability of activities when, for example, an expatriate works with a local technician, with the ultimate aim that the expatriate will be training his successor. The degree of success is often influenced by the quality of the relationship between the two individuals and how good a teacher the expert actually is.

4.7.4 Literacy

Some remarkable successes have been achieved in developing the level of literacy in rural communities. Among the exercises sponsored by USAID, the literacy activities of KAED and CBNRM stand out. With increased literacy has come increased business acumen and sophistication. More importantly, literacy is a life skill that over time prepares an individual to meet future challenges with greater confidence. An example of this is in Guinea-Conakry, where besides being shown improved Ag/NRM skills, farmers are also being taught to develop farm management plans, including rudimentary accounting and crop production monitoring[5].

4.7.5 Formal Training

Formal training is usually provided as part of a standard program offered by an institute of higher education, either in country or overseas. While not doubting the benefit that the individual obtains from such training, we would argue that the organization for which the individual works is likely to be disadvantaged. The most important factors to bear in mind include the following:

- Such individuals will not be available to undertake their normal work for the duration of the course, perhaps for up to three years in the case of a degree course.

- If the course is held overseas (often the case in USAID and other donor assistance programs), the course is unlikely to be totally adaptable to the conditions of the home country. Does a rangeland ecologist from Senegal really gain from learning about caribou feeding habits on Arctic tundra?

- Having received a good education will make the individual much more employable in the private sector, both at home and overseas, thus increasing the possibility that the person will be recruited away from the organization that allowed or sponsored the education in the first place.

In general, we are not in favor of this type of training unless there is some tie-in clause for a set period after training is concluded.

[5] At the Expanded Natural Resource Management Activity Project (ENRMA) based in Conakry, Labé and Géckédou.

Lessons Learned

48. Training programs must ensure that the benefit to the sponsoring organization is not put in second place behind the benefits to be enjoyed by the trainee.

49. Literacy classes can have enormous accrued benefits in areas such as improved business acumen.

50. Long-term courses, especially those to be provided overseas, should be directly related to the realities to be encountered within the home country, when possible.

51. Demonstration fields and "model farmers" are excellent extension methods that are frequently overlooked by projects.

52. Generally speaking, financial inducement to attend workshops or other training forums should be avoided.

4.8 Methods of Financing

Various means of financing Ag/NRM interventions have been tried, particularly those being undertaken with rural populations in the field. The project tries to stimulate the acceptance by rural producers (groups or individuals) of relatively unknown and untried practices, or those considered to be too costly, by helping with the financial investment involved in that adoption. The various means attempted can be categorized as grants, cost sharing, or access to credit. Each method has its pros and cons and they will be examined here.

4.8.1 Grants

The provision of grants is a widespread approach to donor assistance involving the total financing of an Ag/NRM intervention. Grants are more frequently made to associations or groups than to individual producers. This is done partly to spread the effect of the grant more widely and partly to allow better management of the funds — a prerequisite of many donors.

USAID has been a pioneering donor in allocating grants, but has not always achieved satisfactory results. There may be several reasons for this underachievement:

- The barriers for grants to be allocated are frequently too rigorous, and the monitoring requirements that projects place on the recipients too arduous
- The administration and management demands of a grant portfolio increase in tandem with the number of grants accorded
- A grant for a given Ag/NRM intervention constitutes a gift and therefore may not be appreciated by the recipient in the same way as cost-sharing or credit

Entry and monitoring requirements too rigorous. Grant provision does not simply involve handing out money to suitable rural groups because this would introduce the possibility for misuse or misappropriation of funds. Donors and the executing project lay down specific criteria that associations, groups, or NGOs must meet before any money is provided. Unfortunately, the barriers to entry are often set unrealistically high. For example, on USAID's Agriculture and Natural Resources (ANR) project in The Gambia, not a single grant was given during the total 18-month life of the project (closed down by the coup d'état) because the criteria were too

onerous. The only organization that came close to being awarded a grant was an international NGO (WWF-US). No local associations, CBO, or NGO managed to match the criteria, especially those related to financial management. Similarly on the Agriculture Sector Development Grant (ASDG II) project in Niger, criteria were sufficiently harsh that the vast majority of demands were rejected — lack of an adequate monitoring and evaluation scheme being a common reason. If the grant method is to be employed, criteria must be developed to match the capacity of the recipients, or training programs developed expressly for grant requesters must be offered.

Administration and management of a grant portfolio. In general, it takes approximately the same amount of time to set up and manage a small grant as a large one. Therefore, the tendency is to allocate fewer, larger grants rather than many smaller ones. This approach favors large organizations and excludes smaller village-based groups or organizations, the very structures for which the grants' schemes are designed.

Grants constitute a gift. Considerable debate surrounds the question of whether grants should be allocated for a given Ag/NRM intervention or whether the recipient should have to contribute toward the actual costs. Of course, the possibility exists that the grant may be taken because it is there, but the barriers to allocation are such that considerable effort must be made before the grant is awarded. Grants occupy a valuable space in the arsenal of donor organizations, but the system of selection, allocation, and training has to be carefully developed to suit local conditions.

4.8.2 Cost Sharing

In this method of providing assistance to the target populations, costs are divided between the donor organization and the recipients. CBNRM has used this system extensively with variable results. The real value of cost sharing is that the recipient has to financially contribute to the activity he is to undertake. Therefore, the recipient has a stake in the success or failure of the operation. Such pump priming may be the only means that the recipient possesses to get an important Ag/NRM activity underway. The negative aspect is that the recipient is still receiving something for nothing, a situation that is obviously not sustainable over the long-term, and the process frequently selects out those with some money to invest and thus excludes the poorer sector of society.

4.8.3 Credit

This method of helping local communities invest in their own future is becoming increasingly widespread across the developing world. Famous micro-credit schemes have been set up in Bangladesh, and nearly all donor-assisted countries are now experimenting with different credit arrangements. Currently, these methods have the tendency to be project driven (e.g., provision of loan guarantees to credit organizations, assistance to make applications, provision of finance to fund the credit start-up). However, considerable success is being achieved with the methods underway. The village credit schemes established with the assistance of KAED are allowing many peasant farmers in the Kaolack region to attain access to small amounts of credit and initial results are favorable. KAED's system has the potential to constitute a sound working model and could valuably be assessed further.

Currently, the larger and traditional credit organizations and banks are rarely willing to accept the risk that such credit provision entails, or they are uninterested in managing the small amounts involved. When they do provide credit, it is often at extremely high interest rates that discourage borrowing.

Credit associations offer perhaps the best financial means for sustainable investment in natural resource management, especially at the village level. We would encourage the continued provision of this form of assistance. On a cautionary note, before establishing such associations, substantial planning is required to ensure that the credit management system can be operational and remain in place after the period of donor assistance has expired.

Lessons Learned

53. Various forms of financing Ag/NRM interventions are available, and their applicability in a particular situation must be carefully studied.

54. Grants do not require recipients to invest their own money into the scheme. This is a serious disadvantage. Many grant systems that have been established are too time consuming and rigorous.

55. Cost sharing and especially credit schemes require that recipients invest in their own future. We consider this to be the best solution. However, banks and rural credit associations will need to be stimulated to develop easier access to rural credit schemes. The excellent small, village-based schemes established, for example, by KAED and CBNRM may prove insufficiently robust to meet medium-term loan requirements.

ANNEX A

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ANNEX B

Professional Contacts

1. Dakar

First Name	Last Name	Organization	Function
1.1. Projects			
Charles "Chuck"	MAY	DYNA Entreprises	Chief Technical Advisor
Jim	FICKES	CBNRM	Chief Technical Advisor
Kent	ELBOW	CRNRM	Technical Advisor
Papa Meïssa	DIOPP	CBNRM	Training Officer
Mamadou	DIANKA	PROGEDE	Director, Demand Component
1.2. Government			
Benjamin	DIOUF	ANCAR	Managing Director
Moctar	NIANG	CSE	Managing Director
Ababacar	BOYE	Forestry Service	Assistant Director
Aboubacry	LOM	Planning Directorate	Director
Mme.	SECK	Planning Directorate	Division Chief
Abdoulaye	SENE	Mission Vallées Fossiles	Director
Mr.	SECK	Mission Vallées Fossiles	Program Officer
Colonnel Pape M.	DIOP	President's Office	Technical Advisor/Natural Resources/Ag
Pape	DIOUF	Ministry of Agriculture	Minister of Agriculture
1.3. Donors			
Mike	McGAHUEY	USAID/Washington	Program Officer
Gertjan	TEMPLEMAN	Embassy of the Netherlands	First Secretary (Development Assistance)
Michael	SIEBERT	GTZ	Coordinator and Technical Advisor for Natural Resources
Marie Dia	BA	FAO	Program Assistant for Natural Resource Management
Arona	FALL	UNDP	Program Officer

First Name	Last Name	Organization	Function
1.4. NGO			
Gorgui Sène	DIALLO	Africare	Program Officer
Mamadou	CISSOKHO	CNCR (National Farmer's Association)	President of CNCR
Ousmane	THIOUNE	ENDA Syspro	Program Officer
Thierno	SECK	ENDA Syspro	Program Officer
Ndiogou	SECK	ENDA Syspro	Program Officer
1.5. Others			
Médoune	DIENE	Former Director of Agriculture	Consultant
Khassim	NDOUR	Private Gardner at Sébikotane	
Jacques	FAYE	Swiss International Aide and Former Director of ISRA	Consultant
Oussoubi	TOURE	Former CONSERE Director	Consultant
2. Lac de Guier, Keur Momar Sarr, Vallée du Fleuve			
2.1. Government			
Papa Amadou	SIDIBE	Pilot Farm at Keur Momar	Farm Foreman
Arona	TRAORE	Pilot Farm at Keur Momar	Irrigation Specialist
Bounama	FAYE	Pilot Farm at Keur Momar	Operations Coordinator
Abdoulaye	FAYE	Pilot Farm at Keur Momar	Maintenance Coordinator
Mr.	GUEYE	Pilot Farm at Keur Momar	Logistics Coordinator
Abdourahim	NDIAYE	SAED	Irrigation Specialist
2.2. NGO			
Djibril Moussa	LAM	PAGEN	Coordinator
Abdou Mamour	BA	PAGEN	Activities Coordinator
Belel	BA	PAGEN	Livestock Specialist
Ciré Bocar	WANE	UJAK	Program Officer
Mlle Ramata	BA	UJAK	Program Officer
Mme Belel Ly	DIOP	UJAK	Women's Activity Specialist

First Name	Last Name	Organization	Function
3. Kaolack			
3.1. Government			
Ablaye	MBAYE	ISRA	Station Chief
El Hadj Ibrahima	THIAM	ARD	Director
3.2. Projects			
Wilfried	KREMER	PAGERNA	Technical Advisor
Mme	SARR	PAGERNA	Sociologist
Saliou	MBODJ	PAGERNA	Land Use Planner
3.3. NGO			
Coumba Diouf	SECK	Africare	Coordinator PRASS II
Boubacar	SOW	Africare	Coordinator
3.4. Others			
N'Déné	DIOUF	N'Gane, near Gandiaye	Independent Farmer
4. Tambacounda			
4.1. Projects			
Babacar Salif	GUEYE	PROGEDE	Director of Regional Operations
Pape	SARR	CBNRM	Division Head
Mamory	DIAGNE	CBNRM	Chief Officer, Missirah zone
Boubacar	THIAM	CBNRM	Chief Officer, Kolda zone
Ousmane	SECK	CBNRM	Consultant, ACA
Amadou Barro	WATT	GIE	CBNRM Beneficiary
Mr.	COULIBALY	GIE	CBNRM Beneficiary
4.2. Government of Senegal			
Moussa	DIALLO		Sub-Prefect, Missirah
Dialimakha	CISSOKHO	CERP	Forestry Agent
Mamadou Mansour	NDIAYE	CERP	Agricultural Agent
4.3. NGO			
Lamine	DIALLO	GADEC	Regional Coordinator

First Name	Last Name	Organization	Function
5. Kolda			
5.1. Projects			
Dorith	VON BEHAIM	PSPI	Technical Advisor
Mansour	SARR	PFRK	Coordinator
Samba	BARRY	Rural Community of N'Dorna	CBNRM Beneficiary
Modou Fana	CISSE	Rural Community of N'Dorna	CBNRM Beneficiary
Aliou	BALDE	PATA	President, CBNRM Management Committee
5.2. Others			
Mamadou Mao	BALDE	Rural Community of N'Dorna	President of the Rural Council of Pata